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TRANSACTIONS

OF THE

Fifteenth International Congress on Hygiene and Demography

WASHINGTON

September 23–28, 1912

PUBLISHED BY THE COMMITTEE ON ORGANIZATION

EDITED BY THE SECRETARY GENERAL

VOLUME VI

PROCEEDINGS OF SECTION IX

Demography

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Dr. CRESSY L. WILBUR, Chief Statistician for Vital Statistics, Census Bureau, Washington.

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[1] Dr. John S. Billings died in New York City on Mar. 11, 1913, in the seventy-fourth year of his age.

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SECTION IX.

DEMOGRAPHY.

REPORT OF THE SECRETARY.

Prof. WALTER F. WILLCOX, *President Section IX,*
Fifteenth International Congress on Hygiene and Demography.

SIR: In accordance with the provision of Article XII of the regulations of the congress, I herewith submit a report of the proceedings of Section IX during the meeting held at Washington, September 23 to 28, 1912, together with such manuscripts of the papers read as have been delivered into my hands.

MONDAY, SEPTEMBER 23, 1.45 P. M.

The meeting for organization was called to order by the president of the section, Dr. Walter F. Willcox, in room 43, New National Museum.

The following list of honorary presidents of the section was announced:

M. MAURICE SAUVEUR (Brussels, Belgium); M. LUCIEN MARCH (Paris, France); Dr. JACQUES BERTILLON (Paris, France); Dr. GEORG EVERT (Berlin, Germany); Dr. EUGEN WÜRZBURGER (Berlin, Germany; Dr. ARTHUR NEWSHOLME (London, England).

After which the meeting adjourned.

TUESDAY, SEPTEMBER 24, 9.15 A. M.

The first scientific meeting was called to order by the president of the section, who delivered the following address:

FELLOW MEMBERS OF THE FIFTEENTH INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY—LADIES AND GENTLEMEN:

It is my pleasant privilege to welcome you at this opening meeting of the section on demography. For the first time in its history the International Congresss on Hygiene and Demography is meeting outside of the continent in which it was born, and across the ocean from the lands which have reared it to maturity and influence. Perhaps this venture upon an ocean voyage may be interpreted as evidence that it has now attained an age and a virility when migration will strengthen its beneficent power and extend the range of its influence.

In an international scientific congress like this, at which the experience of the different individuals and countries is exchanged and compared, the younger persons and the younger countries, other things equal, are likely to profit more than the elder. We are deeply indebted to the many scientists who have journeyed far to bring to their younger sister the results of their research and experience. The several countries in the family of nations have developed in diverse ways, and we trust that, in the fields of hygiene, our visitors may find that they have something to see or to hear as

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well as much to offer. But in the field of demography, with which this section is concerned, a foreigner is unlikely to visit the United States unless drawn hither by curiosity, philanthropy, or duty. The sluggish and retarded development of American demography is familiar to all students of the subject. But a new life has been stirring since the twentieth century began and we may hope that the stimulus and incentive of this congress will do much to bring American demography abreast of that of other countries.

It is with especial pleasure that we welcome to-day the demographers from France and Germany, representing countries whose contributions to our science have been of the very first importance.

It is with keen regret that I mention the absence of the English delegate who especially represents demography, a man whose statistical contributions to the recent International Congress on Tuberculosis did so much to make its session memorable. We are disappointed also that there is with us no representative of the registrar general's office, from which much of the stimulus to American demographers has come. The heavy burden of work caused by recent legislation and the recent census, together with death, have combined in producing this result.

The man who for many years did more than anyone else in the United States to keep the standard of our science flying in the face of indifference or active opposition is the honored vice president of our section, Dr. John Shaw Billings. Serious ill health and a grievous domestic calamity make it impossible for him to be present at our congress. He asks me to express to his friends his great regret at being unable to greet them in person.

At the conclusion of his remarks Dr. Willcox proposed that greetings be sent to certain distinguished demographers who were unable to be present. The motion was seconded by Dr. Bertillon and adopted unanimously by the section.

The following cablegrams and telegrams were sent:

Senator Luigi Bodie, *Rome, Italy.*

Demographers at opening session greet president International Statistical Institute.

Wilbur, *Secretary.*

Prof. Georg von Mayr, *Munich, Germany.*

Greetings and best wishes from statisticians gathered at Washington to dean of German statisticians.

Wilbur, *Secretary.*

Dr. John Shaw Billings, *New York.*

Greetings and sympathy from opening session to one whose work in demography marks an epoch in the American development of that subject.

Wilbur, *Secretary.*

The section then proceeded according to the regular program for the morning, which was duly completed, as follows:

The Development of Vital Statistics in the United States since 1900; Measures Needed for the Immediate Future, by Dr. Cressy L. Wilbur, chief statistician for vital statistics, United States Census Bureau, Washington.

How the Model Law Is Enforced in Pennsylvania, by Dr. Wilmer R. Batt, State registrar of Pennsylvania and chairman

section on vital statistics, American Public Health Association, Harrisburg, Pa.

How the Model Law Was Installed in Missouri, by Dr. Frank B. Hiller, secretary of the State Board of Health and State registrar of vital statistics, Jefferson City, Mo.

Preparing for the Operation of the Model Vital-Statistics Law in Virginia, by Dr. W. A. Plecker, director Bureau of Vital Statistics of Virginia, Richmond.

Vital Statistics in Louisiana, by Dr. Oscar Dowling, president Louisiana State Board of Health.

Improvement in Birth Registration, by Dr. Eugene H. Porter, commissioner of health of the State of New York, Albany.

The Relation of Rural and Urban Populations as Shown by the Census in the United States and Canada to Public Health Problems, by Dr. Peter H. Bryce, chief medical officer to the Bureau of Immigration, Department of the Interior, Ottawa, Canada.

Classification of the Causus of Death, Modifications Adopted in 1909, and Those Which May Be Necessary in the Future, by Dr. Jacques Bertillon, chief of the Bureau of Municipal Statistics, Paris, France.

The following members of the congress took part in the discussion:

Dr. Watson S. Rankin (Raleigh), Dr. Eugen Würzburger (Berlin), Dr. Cressy L. Wilbur (Washington), Dr. William F. Snow (Sacramento), Dr. Jacques Bertillon (Paris).

TUESDAY, SEPTEMBER 24, 2 P. M.

The second scientific meeting was called to order by the president. The regular program was preceded by a paper on—

The Development and Scope of Population Statistics in the United States, by Dr. Roland P. Falkner, assistant director of the Thirteenth Decennial Census (1911–12).

The following papers were read in the symposium on the training of demographers:

The Training of Demographers in Germany, by Dr. Eugen Würzburger, director Royal Statistical Office of Saxony, Dresden.

How Are Trained Statisticians Secured in France? by M. Lucien March, director of the General Statistics of France, Paris.

How May the Demand for Demographers and the Supply of Them in the United States Be Increased? by Prof. Walter F. Willcox, president of the American Statistical Association, Cornell University, Ithaca, N. Y.

The next topic for consideration was mechanical methods of tabulating statistics. The following papers were read:

The Development of Mechanical Methods of Statistical Tabulation in the United States, with Especial Reference to Population and Mortality Data, by Mr. Harry T. Newcomb, Washington, D. C.

Tabulation by Mechanical Means; Their Advantages and Limitations, by Hon. E. Dana Durand, director of the Census, Washington, D. C.

WEDNESDAY, SEPTEMBER 25, 9.15 A. M.

The third scientific meeting was called to order by the president.

The following cablegram from Dr. Georg von Mayr in response to the cablegram sent him by the section yesterday was read:

TUTZING, *September 25, 1912.*

WILBUR, *Census Bureau,*
Washington, D. C.

Statistical colleagues, hearty thanks. Greetings.

MAYR.

Also the following letter from Dr. von Mayr addressed to Prof. Rubner was read by Dr. Würzburger and translated by Mr. Hoffman:

HOCHVEREHRTER HERR KOLLEGE:

Je näher die Tagung des Kongresses für Hygiene und Demographie in Washington rückt, umso schmerzlicher empfinde ich es, dass ich diesmal zum Kongresse nicht anwesend sein werde. Wem als dem hochverehrten seinerzeitigen Kollegen im Vizepräsidium des schönen Berliner Kongresses darf ich dies wohl gestehen; daran möchte ich die Bitte reihen, von diesem meinem Empfinden, wenn sich Gelegenheit gibt, dem Kongresse Mitteilung machen zu wollen; an das Bedauern nicht kommen zu können, möchte ich dazu meine besten Wünsche für vollen Erfolg des Kongresses reihen. Mitglieder des Kongresses, die sich meiner etwa freundlich erinnern sollten, lasse ich herzlich grüssen.

Ihnen aber, hochverehrter Herr Kollege, wünsche ich von Herzen gute Reise und glückliche Heimkehr.

In aufrichtiger Verehrung, Ihr ergebenster Kollege,

GEORG VON MAYR.

The section then proceeded to the consideration of the subject of the present position of municipal vital statistics.

The following papers were read:

Municipal Vital Statistics in Germany, by Dr. Eugen Würzburger, director of the Royal Statistical Office of Saxony, Dresden.

Municipal Statistics of the Movement of Population in Belgium, by M. Maurice Sauveur, director general, Royal Bureau of Statistics, Brussels.

The Present Position of Municipal Vital Statistics in the United States, by Mr. Frederick L. Hoffman, statistician of the Prudential Insurance Co. of America.

The paper of Mr. Hoffman was discussed by Dr. William H. Guilfoy, of New York.

In the symposium on infant mortality in the United States and other countries the following papers were read:

The World-Wide Effort to Diminish Infant Mortality; Its Present Status and Its Possibilities, by Mr. Edward Bunnell Phelps, editor the American Underwriter, New York.

Statistical Comparison of the Mortality of Breast-Fed and Bottle-Fed Infants, by Dr. William H. Davis, vital statistician, Boston Health Department.

Infant Mortality in New York City, by Dr. William H. Guilfoy, registrar of records, Department of Health, New York City.

The subject of infant mortality was discussed by Mr. Evans McCarthy (New York).

THURSDAY, SEPTEMBER 26, 9.15 A. M.

The fourth scientific session was called to order by Vice President Hoffman.

After opening the session Mr. Hoffman made the following statement with reference to his paper of the preceding day on municipal statistics:

What I said was, in substance, that a tendency had of recent years developed on the part of local boards of health to shift their respective duties of inspection upon the Division of Vital Statistics of the Census and that to this extent the establishment of such a division in the permanent census office has been rather a hindrance than a help to the cause of municipal vital statistics in the United States.

The following papers were read in the symposium on American statistics of marriage and divorce:

Divorce Statistics, by Rev. Samuel W. Dike, LL. D., secretary National League for the Protection of the Family, Auburndale, Mass.

Marriage Statistics in the United States, by Dr. Joseph A. Hill, chief statistician for revision and results, United States Census Bureau, Washington.

It was moved by Dr. Southard that the executive committee of the section formulate resolutions relative to the reporting of marriage statistics, and report at a subsequent meeting. The motion was carried.

The section now turned its attention to a discussion of the subject of eugenics and demography. The following papers were read:

Eugenics and Demography, by Prof. James A. Field, University of Chicago, Chicago, Ill.

The Eugenics Record Office—Its History, Purpose, and Methods, by H. H. Laughlin, superintendent Eugenics Record Office, Cold Spring Harbor, Long Island, N. Y.

Insanity in the Smaller Cities of Massachusetts, 1901–1910, by Prof. E. E. Southard, pathologist to the Massachusetts Board of Insanity, Boston, Mass.

Statistics of Families, by M. Lucien March, director of the General Statistics of France, Paris.

The paper by M. March was discussed by Prof. Walter F. Willcox (Ithaca).

THURSDAY, SEPTEMBER 26, 2 P. M.

The fifth scientific session was called to order by the president.

The subject for consideration was the present condition of criminal statistics in the United States and European countries. The following papers were read:

General Problems of Criminal Statistics, by Prof. Georg von Mayr, Imperial Under-Secretary of State at disposition, professor of statistics, finance, and economics, University of Munich. (A summary in English of Prof. von Mayr's paper was read by Prof. Robinson.)

The Condition of Criminal Statistics in the United States, by Mr. John Koren, president American Statistical Association, Boston.

A paper on—

Progress Toward the Construction of Life Tables for the Population of the United States, by Mr. Miles M. Dawson, consulting actuary, New York City, was read by title.

FRIDAY, SEPTEMBER 27, 9.15 A. M.

The sixth scientific session was called to order by the president. The following papers were read:

Workingmen's Insurance and Poor Relief in Germany, by Ministerialrat Dr. Friedrich Zahn, director of the Bavarian Royal Statistical Office, Munich, Germany.

Woman in Industrial Life of the Principal Civilized Nations—A Social, Demographic, Hygienic Study, by Ministerialrat Dr. Friedrich Zahn, director of the Bavarian Royal Statistical Office, Munich, Germany.

On the Establishment of a Series of Norms of Death Rates for Various Diseases, by G. H. Knibbs, Federal statistician, Commonwealth of Australia.

The Determination and Uses of Population Norms Representing the Constitution of Populations According to Age and Sex, and also According to Age Only, by G. H. Knibbs, Federal statistician, Commonwealth of Australia.

The following resolutions were then read by President Willcox and adopted by the section, a separate vote being taken on each subdivision thereof:

I.

The congress desires that in every country the statistics of births, deaths, marriages, and divorces may be published periodically and if practicable annually.

II.

1. The congress believes that countries, states, or large cities which publish demographic statistics need registrars or similar officers sufficiently trained in medicine and demography and able properly to interpret demographic statistics, especially those of causes of death.

2. The congress believes that provision for the training and opportunity for the appointment and retention of such men are of fundamental importance in public-health work.

III.

1. The congress desires that family statistics, including those of children born and children living, be gathered periodically in connection with the census.

2. The congress desires that in connection with the registration of births information be gathered showing the order of this birth in the family.

3. The congress desires that in connection with the registration of deaths of married, widowed, or divorced persons information be gathered regarding the children, if any, of the decedent.

IV.

1. The congress desires that in every country criminal statistics may be published periodically and if possible annually.

2. The congress desires that a commission be appointed to report upon the subject of uniformity in criminal statistics, especially a uniform nomenclature.

3. The congress desires that the International Statistical Institute at its meeting at Vienna in 1913 be invited to cooperate in the examination of this subject.

V.

The congress urges the demographers of the several countries to pay special attention to the influence of occupation upon mortality.

FRIDAY, SEPTEMBER 27, 2 P. M.

Joint session with Section IV. For program see the report of the secretary of Section IV.

Reports of discussions as given to the secretary will be found in the transactions of this section.

Respectfully,

Dr. Cressy L. Wilbur,
Secretary of Section IX.

TUESDAY MORNING, SEPTEMBER 24, 1912.

HE DEVELOPMENT OF VITAL STATISTICS IN THE UNITED STATES SINCE 1900—MEASURES NEEDED FOR THE IMMEDIATE FUTURE.

Dr. Cressy L. Wilbur, Chief Statistician for Vital Statistics, United States Census Bureau, Washington.

The backward condition of vital statistics in the United States has long been considered a reproach to American civilization. I do not know that this feeling has ever been more forcibly expressed than in the letter of transmittal prefixed by the Director of the Census to the (little) Physician's Pocket Reference to the International List of Causes of Death. Mr. Durand's letter began as follows:

> It seems to me that there is almost nothing more important in the entire field of statistics than vital statistics, because of their direct bearing upon the health and consequent welfare of the people. It certainly is both strange and shameful that the United States should be so far behind the other leading countries of the world in the registration of deaths and even more so in the registration of births.

Strange and shameful! While every other civilized country on earth provides for the orderly and complete registration of the births and deaths of its people, the "registration area" of the United States for the last year (1911) included, for deaths alone, only 22 States out of the 48 in the American Union, besides one State with partial registration (municipalities of 1,000 population and over), the District of Columbia (city of Washington), and 38 cities in non-registration States. The aggregate estimated population was 59,275,977, or 63.1 per cent of the total estimated population of continental United States. The provisional birth registration area was even less, including only eight States, the District of Columbia, and the city of New York, with an aggregate estimated population of 22,685,537, or 24.2 per cent of the total population of continental United States.

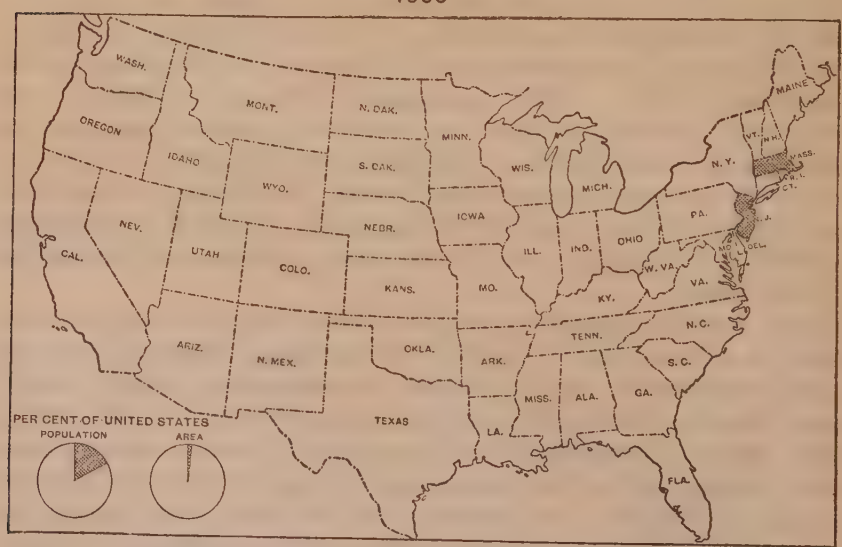
Even for the registration area for deaths the returns are not complete in all instances. The limit of minimum efficiency has long been established as 90 per cent of the deaths that actually occur. Some States undoubtedly register over 95 per cent of their deaths, some perhaps practically all of them; but there are certain States now included in the registration area for deaths in which the percentage of efficiency is dangerously near the limit, if not even below it. And for births, certainly up to the past year or two, not a single State and not a single city of any size in the entire country could claim to have practically complete registration.

The development of the registration area for deaths since its establishment by the Tenth Census (1880), both with respect to the proportion of the population and territorial expanse of the country included therein, may be seen in the following table and accompanying cartograms, in which the shaded areas represent registration States, and, in the circles, the percentages of the registration area to (*a*) total population and (*b*) total area of continental United States.

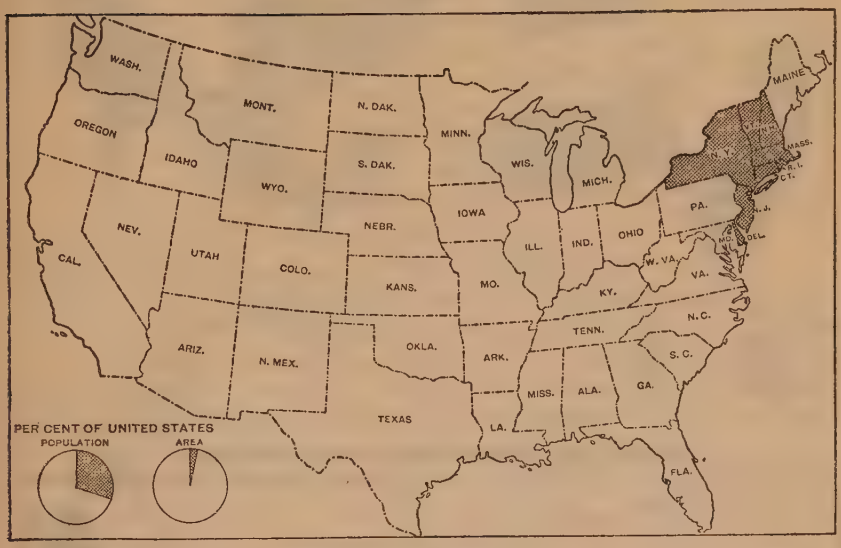
Year.	Population of continental United States.	Registration area for deaths.			
		Population.		Land area.	
		Number.	Per cent of total.	Square miles.	Per cent of total.
Census year—					
1879–80[1]	50,155,783	[1] 8,538,366	17.0	16,481	0.6
1889–90[1]	62,622,250	[1] 19,659,440	31.4	90,695	3.0
1899–1900[1]	75,994,575	[1] 28,807,269	37.9	176,878	5.9
Calendar year—					
1900[1]	75,994,575	[1] 30,765,618	40.5	212,621	7.1
1901	77,747,402	31,370,952	40.3	212,770	7.2
1902	79,365,396	32,029,815	40.4	212,762	7.2
1903	80,983,390	32,701,083	40.4	212,762	7.2
1904	82,601,384	33,345,163	40.4	212,744	7.2
1905	84,219,378	34,052,201	40.4	212,744	7.2
1906	85,837,372	41,983,419	48.9	603,066	20.3
1907	87,455,366	43,016,990	49.2	603,151	20.3
1908	89,073,360	46,789,913	52.5	725,117	24.4
1909	90,691,354	50,870,518	56.1	765,738	25.7
1910	92,309,348	53,843,896	58.3	997,978	33.6
1911	93,927,342	59,275,977	63.1	1,106,740	37.2

[1] As of June 1. For other years approximate mid-year estimates.

1880



1890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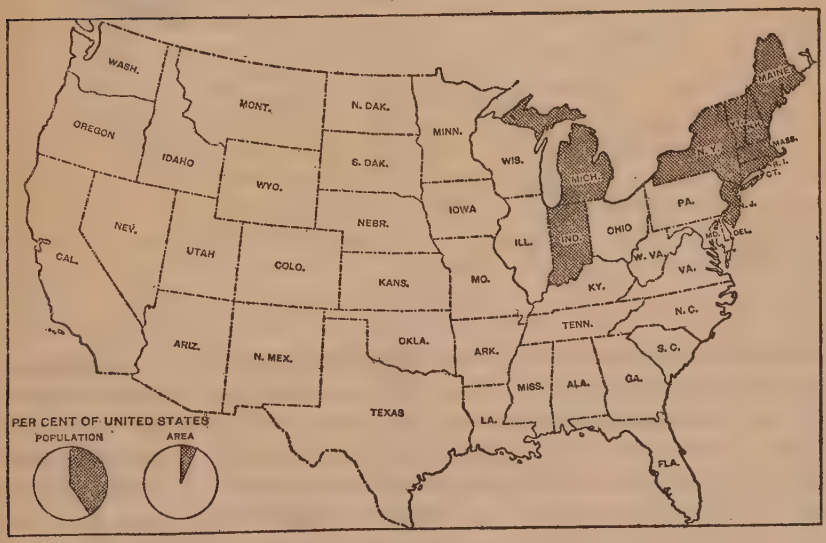
FLA.
PER CENT OF UNITED STATES
POPULATION
AREA

1900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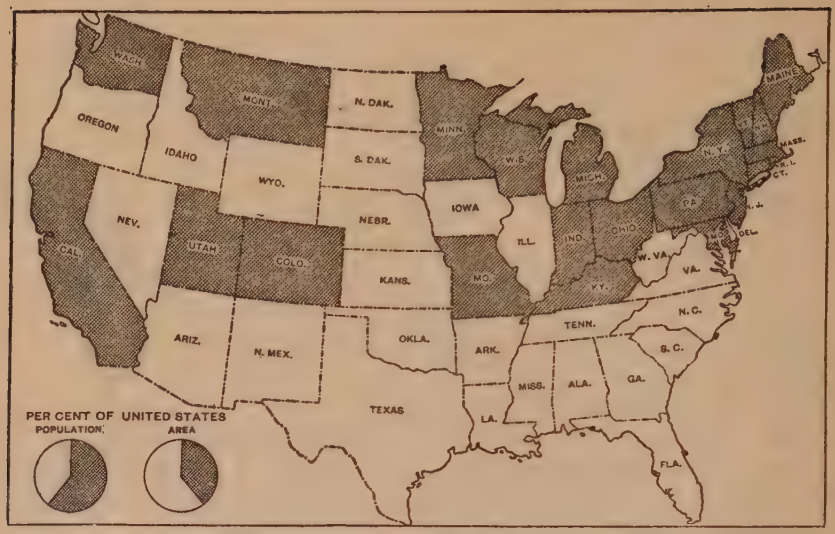
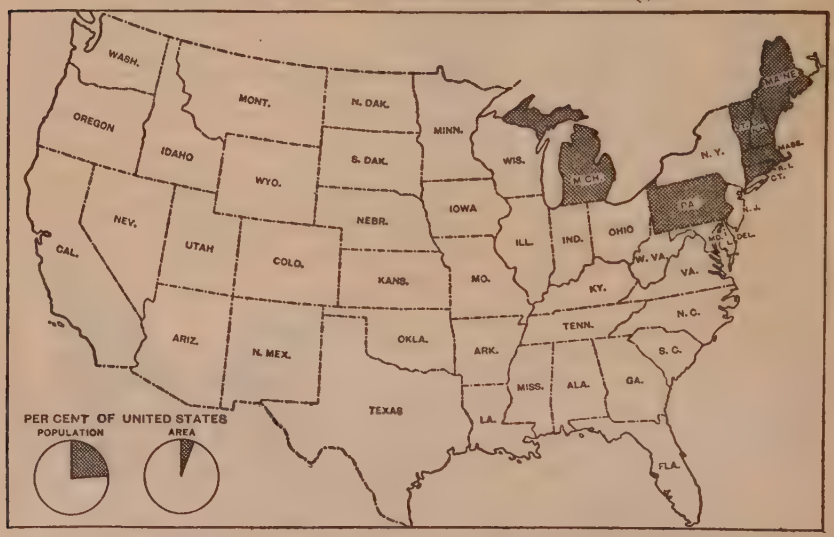
PER CENT OF UNITED STATES
POPULATION
AREA

1911



PROVISIONAL BIRTH REGISTRATION AREA: 1911



A similar table and cartogram show the extent of the provisional birth-registration area for 1911. While it included 24.2 per cent of the total population, it embraced only 5.5 per cent of the total area or land surface of the country. The registration of births is fully a score of years behind the registration of deaths. The reasons for this fact will be considered at greater length below, and reference will be made to the efforts that have been made in the last few years to overcome the difficulties of birth registration; but for the present the chief aim in the extension of the area of effective registration of vital statistics is to secure complete, or practically complete, regis-

tration of deaths. Without this it is futile to expect good birth registration, but with the registration machinery for deaths in successful operation, it is only a question of time and persistence before the registration of births will be brought up to the proper standard and even the registration of morbidity statistics made possible.

Year.	Population of continental United States.	Provisional registration area for births.			
		Population.		Land area.	
		Number.	Per cent of total.	Square miles.	Per cent of total.
Calendar year 1911	93,927,342	22,685,537	24.2	164,635	5.5

The registration of births and deaths in the United States depends chiefly upon the enactment and thorough enforcement of adequate laws for this purpose by the States. The Federal Government has no authority under the Constitution to conduct such work, except for the District of Columbia and upon Federal reservations. If it were possible to enact a national registration law and to secure its enforcement through a strongly centralized administration, the problem might be a comparatively simple one. As it is, however, we have 49 distinct problems instead of 1, and the difficulty of securing fairly uniform and effective legislation at the hands of entirely independent State legislatures, together with thorough enforcement of such legislation, amid all the vicissitudes of State politics, and in the general absence of civil-service provisions for the protection of efficient administrators and employees, may well at times seem a very discouraging if not an insuperable one.

Nevertheless, we are not here to complain of these conditions, but refer to them only to the end that we may consider how best to attack and conquer them; nor to apologize to our distinguished colleagues from abroad—only we hope that they will understand why we have no complete national vital statistics at the present time. This is really a council of war. We have here, in what is practically a joint session with the section on vital statistics of the American Public Health Association, some of the men who are on the firing line in the warfare for better vital statistics for the United States; men who have labored for the enactment of adequate laws in their respective States and have been charged with the high responsibility and trust of enforcing those laws. It is no bed of roses, this work of administering a registration law in the United States, especially in those parts of the country where the people have had little experience of the benefits that are derived from the keeping of accurate records, and are impatient, as are practically all Americans, of any unnecessary restraints or checks—"red tape," we call it—in the affairs of life. In many States at the present time,

except possibly for a few cities having registration under local ordinances, there has never been the least regulation or restraint in the final disposition of the bodies of dead human beings, and the births of children have no more been recorded than those of the beasts of the field—nay, not so much in fact as in the case of valuable or registered animals. Hence, argument and persuasion are necessary as a part of the measures for the enforcement of a registration law, as may be illustrated by the poster employed by the Virginia Health Department in connection with the State law that went into effect on June 14, 1912:

H. D., V. S. Form No. 31—10M. 6-16-12.

IF YOU OWNED A THOROUGHBRED

You Would Want to Preserve His Pedigree.

Would You Not Like to Preserve Your Own? Would You Be Glad to Know that the Birth and Death of Your Father, Yourself, and Your Children Would be Recorded Where You Knew It Would be Kept Forever?

YOU CAN HAVE A

RECORD OF BIRTHS AND DEATHS IN VIRGINIA

If you Will Assist in the Enforcement of the New Law requiring them to be reported. The new law becomes effective on June 14, 1912. After that time, to Assure YOU a record of your life, the State of Virginia will require all births and deaths to be reported, and will aid you in preserving the records of your family, by providing that death certificates be filed before a burial can take place.

THIS LAW IS FOR YOUR PROTECTION AND CONVENIENCE

It aims to preserve YOUR NAME forever—to settle your rights to your property—to safeguard your children's title to your estate.

In cities and towns, the Health Officer, and, in the counties, the Justices of the Peace are to be local Registrars of Births and Deaths. They will issue burial permits when the undertaker, or the person acting as such, files a statement showing the age, parentage, etc., of deceased and a statement from the physician giving the cause of death. The person in charge of a burial is responsible and must get the permit before he inters a body.

Physicians, Midwives or Heads of Families must report all births, so that the record may be preserved in Richmond and at the county seat.

_____ *of* _____ *who lives near you, is LOCAL REGISTRAR for* _____ *city town or the portion of* _____ *Magisterial District within the following bounds:**

Prior to 1900 the slow progress in the adoption of effective registration was due chiefly to the fact that there was no central or Federal office in continuous existence charged with any supervisory or directive influence upon State legislation for this purpose. Many State laws were passed that in practice proved futile, and that might have been known in advance to be incapable of yielding satisfactory results without the test of expensive and discouraging experience. One of the first steps taken by the Census Office after its permanent organization in 1902 was to adopt, in cooperation with a committee of the American Public Health Association, a set of principles or rules for effective registration, and to draft a typical or "model" bill for the consideration of State legislatures. The rapid extension of the registration area since that date has been the result of continued activity along this line in connection with the State authorities, the American Medical Association, and other organizations. The relation of the Census Bureau to the movement is shown by the following resolution expressing the approval of Congress:

JOINT RESOLUTION Requesting State authorities to cooperate with Census Office in securing a uniform system of birth and death registration.

Whereas the registration of births and deaths at the time of their occurrence furnishes official record information of much value to individuals; and

Whereas the registration of deaths, with information upon certain points, is essential to the progress of medical and sanitary science in preventing and restricting disease and in devising and applying remedial agencies; and

Whereas all of the principal countries of the civilized world recognize the necessity for such registration and enforce the same by general laws; and

Whereas registration in the United States is now confined to a few States, as a whole, and the larger cities, under local laws and ordinances which differ widely in their requirements; and

Whereas it is most important that registration should be conducted under laws that will insure a practical uniformity in the character and amount of information available from the records; and

Whereas the American Public Health Association and the United States Census Office are now cooperating in an effort to extend the benefits of registration and to promote its efficiency by indicating the essential requirements of legislative enactments designed to secure the proper registration of all deaths and births and the collection of accurate vital statistics, to be presented to the attention of the legislative authorities in nonregistration States, with the suggestion that such legislation be adopted: Now, therefore,

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Senate and House of Representatives of the United States hereby expresses approval of this movement and requests the favorable consideration and action of the State authorities, to the end that the United States may attain a complete and uniform system of registration.

Approved, February 11, 1903.

THE MODEL LAW.

What is known as the "model law," or perhaps more properly as the "model bill," is the result of observation of methods that have proved successful in American practice, and which we can therefore recommend, with a very considerable degree of assurance providing they are fully carried out, to States requiring such legislation. The bill is not to be understood as an ideal measure in all respects, or as superior, either in methods or results, to the very different procedures adopted in other countries. Its chief recommendation is that it has proved successful and thoroughly practicable in operation in many States and has rapidly raised them to a position which justified their admission to the registration area for deaths. Hence the great importance attached to the model law by American registration officials and the special attention given to the subject in the present symposium.

The first outline of essential principles adopted by the Census Office and the committee of the American Public Health Association [1] dealt with the registration of deaths alone and did not undertake to translate them into the form of a bill. This was done, however, in a later Census pamphlet for deaths,[2] and a still later one for both births and deaths.[3] Subsequently the matter was taken up by the council on health and public instruction of the American Medical Association, which has published a pamphlet on the Present Situation in Vital Statistics Legislation, of which copies are here for distribution. It contains the latest form of the model bill and has been of great service in promoting the extension of adequate registration methods.

The essential principles embodied in this bill may be stated as follows:

ESSENTIAL REQUIREMENTS FOR THE REGISTRATION OF BIRTHS.[4]

1. Births must be recorded immediately after their occurrence.
2. Certificates of birth of standard form should be required.
3. Some check is necessary to secure enforcement of the law.
4. Efficient local registrars are necessary.
5. The responsibility for reporting births to the local registrar should be placed upon the attending physician or midwife, and upon the parents if no physician or midwife was in attendance.
6. The central registration office should have full control of the local machinery and its rules should have the effect of law.
7. The transmission and preservation of returns should be provided for.
8. Penalties should be provided and enforced.

ESSENTIAL REQUIREMENTS FOR THE REGISTRATION OF DEATHS.[4]

1. Deaths must be recorded immediately after their occurrence.
2. Certificates of death of standard form should be used.
3. Burial or removal permits are essential to the enforcement of the law.
4. Efficient local registrars are necessary.
5. The responsibility for reporting deaths to the local registrar should be placed upon the undertaker or other person having charge of the disposition of the body.

6. The central registration office should have full control of the local machinery, and its rules should have the effect of law.
7. The transmission and preservation of returns should be provided for.
8. Penalties should be provided and enforced.

These principles are simple in character, and as carried out in the model law provide for the fundamental necessity of properly compensated local registrars, each with a definitely defined registration district, burial permits, monthly returns of the original birth and death certificates to the State registrar, and adequate central supervision. The local registration district must be small enough, so that the local registrar may, by the exercise of proper vigilance, know whether any births or deaths that occurred have failed to be registered. When too large an area is chosen, as, for example, the county, it is evidently impossible for a person acting as "county registrar" to secure complete enforcement of the law, because it is unreasonable to expect that undertakers will travel long distances in order to obtain burial permits in advance of interment. The convenience of undertakers, physicians, and others must be consulted, so that it will not in any ordinary case entail undue hardship in filing certificates of births or deaths. The "county system" has been tried in many States with various classes of officials as "county registrars," but has invariably and necessarily resulted in failure, so far as reliable vital statistics are concerned. Nevertheless the plan is even yet suggested when registration bills are under consideration and is perhaps the greatest single obstacle to the attainment of successful registration. It is impracticable, moreover, to secure uniform enforcement of law through county officials. Each county is a problem in itself, and the chances are small of having even a large proportion of the county officials develop into fairly efficient administrators. Central control, with direct connection between the State and local (district) registrars and entire elimination of any interference from middlemen, is the only effective plan of organization.

Certificates of death are filled out by the relatives or other informants for personal or statistical particulars and by the medical attendant for the statement of cause of death. The sole responsibility for filing the certificate is placed upon the undertaker or person having in charge the interment or other final disposition of the body. Hence the undertaker must attend, as a rule, to the procuring of the certificate, with signatures of the informant and medical attendant, and he is held to a strict compliance with the law by enforcing the provision that no dead body shall be interred or removed without a permit showing that the certificate of death has been filed with the local registrar.

The requirement for births is similar, the duty of filing the certificate being placed upon the physician or midwife. In the absence of any professional attendance the duty devolves upon the parents, householders, or others. This is in marked contrast to the methods of civil registration in Europe, where it is usually the duty of parents to attend to the registration of the births of their children. The divergence in methods seems to have been suggested at an early date in the history of American registration, as shown by the following extract from the first registration report of Massachusetts (1843), in which Hon. John A. Bolles, secretary of the Commonwealth, remarked that—

> To insure accurate returns to the town clerk of the births, marriages, and deaths, the following proviso might be adopted:
>
> 1. *In case of births.*—Parents, or one of them, under penalty of $20 for each omission, within a period of 10 days after the birth of a child, to give notice thereof to the clerk of the town in which the birth occurs. * * *
>
> The physician, or midwife, present at any birth, in like manner and under like penalties, to notify the town clerk of the birth within the period above named. * * *
>
> 3. *As to deaths.*—No burial to be performed, nor any funeral service, without a certificate from the town clerk [burial permit] that due notice of the death [certificate of death] has been furnished and the record thereof [local register] duly made. All persons taking part in such illegal burial, as clergymen, undertakers, or relations of the deceased, to be liable to a penalty of $20 each.

The selection of the physician or midwife rather than the parent as the person primarily responsible for the registration of a birth has arisen chiefly through the recognition of the fact that it appears to be the only practicable method in this country to secure such returns with a fair degree of completeness. It would be utterly out of the question at present to undertake to require parents of children to attend in person at the office of a local registrar, give the necessary information, and sign the register of births within a specified time, as is the practice in England. It would probably be many years—how long I may leave to the judgment of the practical registration officials present—before such a system could become feasible, while the system of reporting by physicians and midwives is already familiar and requires only to be enforced more thoroughly by means of the penalties of the law to give excellent results.

It is true that objections are raised from time to time against the present methods, and some complaints have been made with respect to the lack of compensation to physicians and midwives for reporting births under the model law. The practice among American States is not uniform in this matter, and the subject has been referred to a special committee composed of representatives of the American Medical Association, the American Public Health Association, the American Bar Association, and the Bureau of the Census, so that the question may be thoroughly considered and the model law revised

in this and any other respects in which it may be defective. Recent decisions of the Ohio Supreme Court, involving the extent of the information that can be collected under the police power of the State, have placed a temporary difficulty in the way of extending the registration area for births, so that it is desirable that the entire foundation and superstructure of this bill shall be examined and the draft revised in all necessary respects.

Even with a law theoretically perfect and based upon unassailable constitutional foundations, the practical enforcement will depend largely upon the education of the people to the importance of registration and the building up of a demand for complete records.

STANDARDIZATION OF METHODS AND RESULTS.

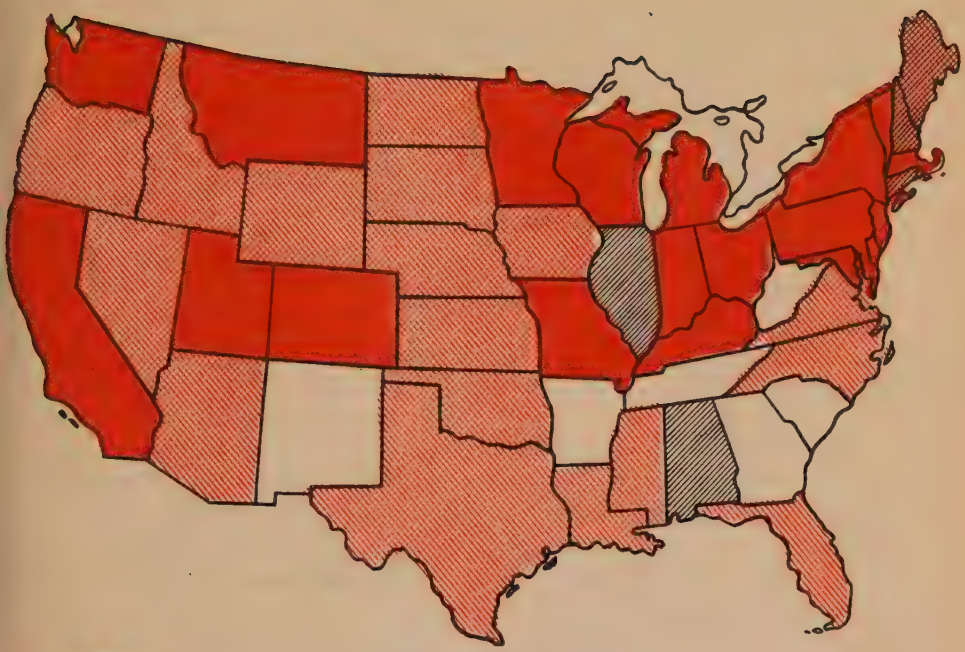
The improvement of American vital statistics must be accomplished from within rather than from without. There is no governmental authority that can prescribe and enforce rules and methods of registration for the country as a whole; hence the upbuilding of an adequate system of national registration must depend upon the education, faithfulness, and progressiveness of the body of American registration officials in the States and cities. Vital statistics have been grossly neglected by public-health administrators, even when recognized—theoretically—as a most essential part of a modern public-health administration. Frequent changes in office and the occasional appointment, for political reasons, of ward heelers as registration officials have degraded and crippled vital statistics as they have other branches of public service. In few offices at the present time are adequate compensation and recognition given to the men responsible for the conduct of registration, and the chief demands of certain administrative officers may be—not the statistical truth, but distorted or partial figures that may be used to bolster up their preconceived ideas. Figures will not lie if treated with decent consideration, but liars will use figures. Populations are juggled, deaths are "counted out" for various reasons, and hence unfair comparisons result. The vital statistician, whether Federal, State, or municipal, ought to be entirely independent in his conclusions and absolutely free from the necessity of yielding to pressure that may lead to the distortion of facts.

The feeling of the great sanitary importance of better vital statistics led to the organization of the section on vital statistics of the American Public Health Association (1907), one of whose chief functions is the building up of an esprit de corps among the practical workers in vital statistics. Such organizations are absolutely necessary to progress in any art or science. It is safe to say that the future progress of American vital statistics, as that of the past, will

be very largely due to the active cooperation of the various organizations with the Government. Among the results already accomplished in this way may be reckoned the introduction (1902) of the United States standard certificate of death and its revision at the meeting of the American Public Health Association at Richmond (1909). This is the fundamental schedule for mortality statistics and the necessity of uniformity throughout the country is apparent. Prior to 1902 the condition was chaotic, no two States and scarcely any two cities in the United States employing the same blanks. The extent to which this condition has been remedied may be seen in the accompanying cartogram.

The adoption of a uniform classification of causes of death (International List) was made possible through the action taken by American registration officials in the American Public Health Association, and the formulation and enforcement of the Rules of Statistical Practice and the adoption in time of uniform and comparable tables in Federal, State, and municipal reports and bulletins will doubtless result through continued cooperative effort. Progress seems slow, as it must be on a voluntary basis. Registration officials are chiefly office trained, and if an official, pitchforked into his position by political chance, has no taste for statistical work or even common ability to perform it, his development is likely to be slow. College-trained men, including, especially, men with medical knowledge, should be more and more available for such positions, and with greater responsibility and dignity attached to the work, adequate compensation, and protection by civil-service rules, and increasing recognition of vital statistics as the absolutely necessary basis of sound public health work, the position of the vital statistician in the sanitation of the future is assured.

We suffer greatly in this country at present from a narrow provincialism that seeks, not the best man for an important work, but the most available man with a local voting residence. I was lately applied to by the health commissioner of one of our largest cities to suggest a candidate for an important statistical office, for which a civil-service examination was to be held. It seemed to me that this was the beginning of better things, so I sent the news to several possible candidates only to learn later on that the competition was restricted to residents of the State of ———. The time will come when a broader spirit of American nationalism will disregard State lines, and a notable beginning of this has already been shown in Minnesota and Mississippi. Only when the States and cities can call freely upon other States and cities for expert administrators, capable of getting results and of training local staffs, will there be much possibility for the development of vital statistics as an attractive profession to which capable young men—and young women—may devote themselves.



Registration States using the Standard Certificate.

Nonregistration States using or recommending the Standard Certificate.

Registration States that have made no changes in certificates since the adoption of the Standard Certificate in 1902; they still retain the old blanks (of excellent form), but will presumably unite with the States using the Standard Certificate when a change is made.

Nonregistration States that have adopted new blanks since 1902, and have not adopted the Standard Certificate.

States left uncolored have no State laws (Arkansas, Georgia, South Carolina) or laws of such unsatisfactory character that the Standard Certificate could not be used.

Registration States are those in which, in the opinion of the Bureau of the Census, at least 90% of all deaths are registered.

Nonregistration States are those in which the registration is below 90%, or in which the adoption of the Standard Certificate has been too recent to allow judgment as to the completeness of registration.

THE NORRIS PETERS CO., WASHINGTON, D. C.

MEASURES NEEDED FOR THE IMMEDIATE FUTURE.

One on the firing line is not always able to discern clearly the general plan of the battle. In the United States we are more concerned, just at present, in the effort to have any vital statistics at all rather than in the refinement that will follow the development of the complete national registration of the future, such as practically all other civilized countries possess to-day.

The first and most important measure, therefore, is the continuation of active work, utilizing all the cooperative agencies available, for the extension of fairly complete registration of deaths (at least 90 per cent of all that occur) over the entire United States. As the greatest difficulties have been encountered in the South, our greatest activity must be in that section of the country, and the three States that have so far yielded the least encouragement to the movement—Arkansas, Georgia, and South Carolina—are those in which the most energetic work must be done. A bill was introduced in the Georgia legislature during the present year.

It is futile to expect birth registration of statistical value in States that do not have practically complete (95 per cent) registration of deaths. It is useless to count on even fairly complete registration of births throughout a State area or in a city unless the law is enforced, with prosecution and fine, in case of continued violation. The birth-registration laws of this country have been practically dead letters, and are dead letters to-day, so far as their thorough enforcement, by means of the penalties provided by law, is concerned. Even in New York city there were practically no prosecutions for violations of these laws by physicians prior to 1910, although many births failed to be registered. Pennsylvania is to-day the only State in which a registration law for births has been thoroughly enforced on a statewide basis. Sporadic prosecutions have occurred in other States, but unless the law is continuously and systematically enforced, efforts to "jack up" delinquents may do more harm than good. Hence I consider the second and most important need of American registration, next to the complete national registration of deaths, to be the enforcement of birth registration by means of reasonable penalties provided by law.

Other needs there are, but they are secondary to the great necessities of extension of adequate laws for the registration of deaths and thorough enforcement of laws for the registration of births. Improvement of the quality of returns will follow complete registration; it is folly to waste effort in obtaining minor "corrections" when many deaths, and more births, fail to be recorded at all. Violation of registration laws should be followed, not as an exception but as the rule, by the imposition of the penalty of the law, and the officials in charge

of its administration should be held to a strict accountability for failure to enforce it. A great obstacle in obtaining complete registration of births is the favoritism extended to physicians who violate the law by physicians who are charged with the enforcement of the law, doubtless through some idea of professional courtesy. This is all wrong, and the honor and reputation of the profession demand that mistaken leniency should no longer protect the small proportion of law breakers at the expense of the good name of the great majority of physicians who are earnestly in favor of adequate registration laws and their thorough and impartial enforcement. In any event the public will not continue to tolerate such conditions. The attorney general of the State of New York in an opinion rendered recently (May 12, 1911) to the State commissioner of health says emphatically:

> I fail to conceive that the prosecution of a physician for a violation of law is more serious than that of a person of any other profession or occupation. Because of the many privileges accorded him by law and his prominent place in society, a duly licensed and registered physician should be one of the first in the community to realize the public benefits secured by compliance with the public health law and he should be one of the first to assist in its enforcement. The authorities in any municipality should not through fear hesitate to enforce the law. Where the authorities of municipalities neglect or refuse to perform the duties of their office they may be removed. The State of New York will not tolerate its system of vital statistics to be impaired by the failure of the authorities of a municipality to perform the duties they have sworn to perform.

Unfortunately in New York the power to enforce the law is not centralized in the State health department, and it is not possible to secure the effective cooperation of all local registrars.

In the building up of public sentiment that will demand the adequate enforcement of registration laws, aid may be expected from the new Children's Bureau, one of whose duties is to study infant mortality, and from the proposed public health bureau, a fundamental necessity of which will be reliable vital statistics covering the entire United States. But these bureaus will in themselves have no more power or authority to collect such statistics than has the Bureau of the Census at present. This work must be done primarily by the States, and the main question is whether the active demands of such sanitary bureaus can awaken Congress to a more effective cooperation with the State authorities.

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[1] Circular 71, Registration of Deaths, published in 1901.

[2] No. 100, Legislative Requirements for Registration of Vital Statistics, 1903.

[3] No. 104, Registration of Births and Deaths, 1903.

[4] Rules of Statistical Practice [APHA], Census Bulletin No. 108.

DISCUSSION.

By W. S. Rankin, M. D., secretary, North Carolina State Board of Health: For the sake of convenience the problem of vital statistics may be considered to be divisible in three parts: The collection of vital statistics, the filing and compilation of vital statistics, and the application of vital statistics to public opinion, or the practical use of vital statistics. It seems to me that the last part of the problem, being that part for which the first two parts serve, is by far the most important phase of the problem.

In considering the application of vital statistics to public opinion, or the practical use of vital statistics, we may again, for convenience, treat this phase of the problem in a triple subdivision, considering, first, the value of vital statistics in interesting and stimulating to definite action those communities most in need of sanitary work; second, the value of vital statistics as a means of controlling and improving local health service by central authorities; and third, the value of vital statistics in properly proportioning the public health forces engaged in combating special causes of disease and death.

The value of applied vital statistics with communities where sanitary work is needed can best be shown by certain concrete examples.

In the summer of 1910 I was invited by a board of county commissioners and board of aldermen to visit their county town and inspect a small collection of water on the outskirts of the town that was supposed to be responsible for a large amount of their sickness. After looking over the pond in the morning and making a general sanitary survey of the town I walked over to the local registrar's office to see how many people were dying and what they were dying from. At 5 o'clock I consulted with the board of aldermen, several physicians, and health officers and others. I called their attention to the fact that the small collection of water was but one very small item for consideration in their health situation; that malaria had caused very few deaths in their town, and it was doubtful if the pond had much to do with their malaria, as there were so many other breeding places for mosquitoes; that with a little ditching and kerosene oil (I went into details) the pond could be dismissed as a health menace; that whereas the pond was of little consequence, other conditions of health in their city were of grave consequence; that, taking statistics from their own official, they had a death rate of 27.5 per thousand, which meant 12.5 people out of every thousand of their population died in excess of the average death rate that obtained throughout the United States; that for 4,000 population this meant an annual unnecessary loss of 50 lives to their town; that even if

they had a death rate of 15, some of the 15 would be from preventable diseases, and, therefore, the 50 lives lost must necessarily be regarded as excessive preventable deaths; that their records showed a death rate from tuberculosis of 317 per 100,000 instead of the average of 167; that their records showed a death rate from typhoid of seven and one-half times the average; that during the last winter their town had had its share of deaths from measles for 60 years; that this last fact meant one of two things: Either an extremely malignant epidemic or more probably inefficient quarantine; that they were most inconsistent in having required a railroad that passed through the town to build an overhead bridge at a cost of $18,000, because during 10 years the railroad had killed at a crossing as many as 10 people; that the interest on the original investment of the railroad and the wear and tear of the bridge would amount to at least $1,500 per year, which they were forcing the railroad to spend to prevent one needless death; that while they were requiring the railroad to spend this amount to prevent 1 death, they, the aldermen, were spending only $150 to prevent 50 deaths.

Since that visit, and I believe largely as a result of that visit, that town and county has taken an unusual interest in public health work. Among other things I may mention that they had, for some time, their town clerk to distribute 1,000 of our monthly bulletins each month in the houses of their citizens, and now the county health officer has added about 1,800 names of the more intelligent and influential citizens of the county to the bulletin mailing list. I regard that town and county at present as being one of the most promising localities in our State for sanitary progress.

Another concrete example of the value of applied vital statistics: I was invited some time ago to visit one of the principal cities of North Carolina to discuss, at a mass meeting of citizens, their health conditions. While driving over the town preliminary to the meeting I met one of the most influential men, who inquired of me why I should come to his town to discuss health conditions when their municipal health was remarkably good. I asked him how much he knew about the health of the town. He replied that he had spent most of his life there, and that he was thoroughly familiar with the city, and he supposed he knew a great deal more about it than I did. With a significant smile he asked me what I knew about the health of ———. I told him that it would not take more than two minutes to prove to him that I knew a great deal more about the health of ——— than he did. To start with, I asked him if he knew how many people per thousand died each year in the United States. He did not. The smile began to disappear. I told him the average annual death rate was 15 per thousand. Then I asked if he knew

the death rate per thousand of ———. The smile was gone. He did not. I informed him that it was 29.5, and that it was the largest death rate in North Carolina, and that, moreover, the figures that I was giving him he could get for himself from his town clerk; that they were his own figures. I further gave him the death rates from most of the preventable diseases throughout the United States. I impressed him with the fact that the excessive preventable death rate of 14.5 per thousand for his city's population of 6,000 meant a needless sacrifice each year of 100 lives. I also pointed out to that gentleman that the colored population of that town had a death rate of 51.2, which would be a disgrace in the Philippines, much less in a civilized community. My self-satisfied friend soon became an attentive listener, and to-day he knows that his town must at an early date pay proper attention to its public health. That night I gave my audience the same facts and am satisfied that within a short time vital statistics will replace self-satisfied presumption about health conditions and bring about sanitary reform in that town that so much needs it.

The application of vital statistics to public opinion depends upon the State board of health being allowed unrestricted publicity in their use. For example: In North Carolina there are 100 counties. At the end of each registration year the State board of health should publish the crude and special death rates of the more important preventable diseases for each of the hundred counties, and should not only publish those death rates, but by the use of charts, cartoons, and editorial matter in a widely circulated bulletin make it a matter of general knowledge which county or counties were unhealthiest and which were healthiest, whipping the unhealthy counties into action with a critical public opinion, and coaxing the healthy counties to continue improvement in sanitary work with public commendation, which would be one of the best advertising assets of such county. I need not go into further detail as to this phase of the value of vital statistics as a body of expert statisticians can readily surmise its effect.

Now, as to the value of vital statistics in furnishing central health authorities a means of control over local health officers. At present the question is frequently asked how, in a country where the fundamental principle of government is local self-government, shall a central authority exercise control over the local officials, and in this connection more especially local health officials? By hammering into the public mind through organs of publicity, press and board of health bulletins, the cardinal fact in health work that public-health work prevents disease, thereby preventing the consequences of disease, death, which means ultimately a lowering death rate. There-

fore, the object of health work is a reduction of death rates, and the efficiency of the local health officer is to be measured by his influence in maintaining a death rate at or below the average death rate, or in his lowering a high death rate.

As soon as the public can be educated to grasp this standard of measurement of health officers, that great law of nature, the survival of the fittest, will be applied with the effect of weeding out the inefficient health officials and maintaining and promoting the more efficient. On this the whole future of public health work rests.

The third value of vital statistics in proportioning the forces engaged in public health service against the various causes of disease and death; right now there is a multiplicity of organizations to combat preventable diseases. These organizations and their representatives are influencing appropriations, and unless vital statistics are accepted as a basis for determining which are our more important enemies, and so used in influencing a proper distribution of appropriations for combating special diseases, our public health service will develop very asymmetrically and lack the efficiency that it otherwise would have.

HOW THE MODEL LAW IS ENFORCED IN PENNSYLVANIA.

Dr. Wilmer R. Batt, State Registrar of Pennsylvania and Chairman, Section on Vital Statistics, American Public Health Association, Harrisburg, Pa.

The enactment of the law providing for the registration of certain vital statistics in Pennsylvania was perhaps somewhat in the nature of an experiment.

The Federal Census Office, after an extended observation of the operation of similar laws in those States, having reasonably satisfactory registration of deaths and also of the failure in other States with inadequate laws, and in yet others with fairly good laws but with ineffective administration, had developed rather definite ideas as to just what statutory features seemed to be essential in order to secure the accurate and complete registration of both births and deaths.

A draft embodying such provisions was prepared and enacted in Pennsylvania in 1905. It is perhaps not too much to say that the successful installation of the law in this State fully demonstrated its practical value and led to its enactment in other States and to its acceptance as the model law by the Federal Census Office, the American Public Health, the American Medical, and other interested associations. From the experience gained through the operations of this model law it must be apparent that there are two, and in reality only two, fundamental requirements to the successful registration of

vital statistics. First, an adequate law, and, second, the enforcement of the provisions of that law. So far as the law itself is concerned it is required that it be specific in character, reasonable in its provisions, and contain the proper penalties for its nonobservance.

No registration law, however, though it be absolutely perfect in its construction, will ever be self-operative. To be effective it must be administered completely and fearlessly.

The keynote of the administration of the model law in Pennsylvania has been primarily a feeling of responsibility by the State bureau that there could be no justification for attempting to evade the responsibility for failure. With local registrars, appointed by the State office, and dismissed for neglect of duty by the same office and with the power of enforcement of the penalties against all who may violate the law, it is entirely within the province of the State bureau to determine the success or failure of registration. Perhaps one of the greatest obstacles encountered by registration officials in the operation of new laws is the apathy and indifference which has been engendered in the minds of physicians, undertakers, sextons, midwives, and even of the people at large by the continued nonenforcement of registration laws which had been in existence for many years. While it is true that many of these laws were totally inadequate for the purpose of accomplishing their object, yet the fact that they existed for years as dead letters on the statute books did perhaps more than any other single thing to create a sentiment that vital statistics were comparatively valueless and their collection not a matter of compulsory importance.

Pennsylvania furnishes rather a striking illustration of this statement, and the conditions there existant were not unlike the conditions prevailing in many other States. When the present law was enacted, in 1905, there had been on the statute books for 50 years a law with identically the same purpose. Drafted with the best intentions in the world, and with lofty resolutions concerning its purpose, it failed utterly in its accomplishment, because the methods prescribed were not practical, and its enforcement was almost totally disregarded.

In organization there is no doubt that the local registrars occupy an important position, as they are the intermediates between the State office and the people at large which may derange the machinery of registration to the extent of creating public ill feeling and antagonism where in reality none should exist.

The first concern of a State office should be, therefore, with the character, earnestness, and fitness of the local registrars. These officials must understand fully the purposes of vital statistics. They must realize their importance. They must, in a quiet, determined manner, impress these facts upon their constituents. They must be willing to impose the penalty of the law and at the same time be

not unmindful that they are public servants and therefore must be courteous, obliging, and considerate in their official relations. If careless and indifferent local registrars can destroy the efficiency of registration, there is, however, no good reason why their derelictions should go undetected and still less reason why they should be continued in office. It is inconsistent to enforce the penalties of a registration law against individuals and not against registration officials.

What checks are available in the central bureau to insure the efficiency of local registrars and of registration? The measure of one will be very largely the measure of both. These are:

1. The promptness of monthly returns by local registrars. A monthly statement sheet of returns should be prepared and all delinquents promptly noted.

2. The percentage of defective certificates received from each registration district. Missing items of information on certificates of births and deaths, when the same can with slight effort be supplied, are good indications of local indifference to the true purposes of registration.

3. The yearly registration of physicians, midwives, undertakers, and sextons. This implies a familiarity with those persons who are important factors in successful registration.

4. The reporting of violations of the law in their individual districts shows the alertness and vigilance on the part of local registrars.

5. The general interest manifested in registration affairs is very freely indicated by the character of registrars' correspondence.

6. The checking of deaths of infants against birth registration.

7. Checking against the returns the reports of births and deaths as published in newspapers.

8. Checking baptismal records against the birth registration.

9. The study of the population of each registration district and a yearly comparison of birth and death rates.

10. Field work in the form of a house-to-house census of births in all districts where there is any suspicion of nonregistration.

Penalties: A local registrar who is indifferent to registration will be equally indifferent to the loss of fees; therefore, this punishment is inadequate. He must be discharged from office and, if necessary, prosecuted.

Undertakers should be prosecuted, and in Pennsylvania willful violations are punished by revocation of license.

Physicians, midwives, and parents who neglect or refuse to report births should be prosecuted.

The enforcement of the law for the registration of deaths is more nearly automatic than for the registration of births, for the reason that detection is easier, and to bury without a burial permit usually

requires the connivance of several persons; i. e., undertakers, sextons, and perhaps the physicians and local registrar.

The registration of births, on the other hand, requires constant watchfulness and a well-executed plan of campaign by the State officer.

HOW THE MODEL LAW WAS INSTALLED IN MISSOURI.

Dr. Frank B. Hiller, Secretary of the State Board of Health and State Registrar of Vital Statistics, Jefferson City, Mo.

In discussing the installing of the model vital statistics law in a State one must necessarily discuss its early administration. The administration, in a sense, goes hand in hand with the installing, and I prefer to detail, to some extent, certain of the administrative features in our State.

The law was enacted by the general assembly in 1909, but because of certain deterring conditions we were delayed in putting it in operation until March, 1910.

A feature of the Missouri law which we regard as admirable is the provision empowering the State board of health to choose the local registrars, instead of these officers being ex officio, as is provided in the statutes of other States. With a free hand being given the board in this matter, after much deliberation it was resolved to appoint physicians wherever possible to the position of local registrar.

It is true that in many districts we have been unable to carry out this rule. This has been due to the fact that in certain small subdivisions of the State no physicians were found to reside, and in other subdivisions where physicians were residing we found it preferable, for certain and various reasons, to select laymen.

We have in the State something like 1,150 local registrars. Of this number probably 950 are members of the medical profession and men prominent and active in practice in their various communities.

QUALIFICATIONS OF LOCAL REGISTRARS.

In enumerating the qualifications of a local registrar I will say he should be a physician, the most representative of his profession of the district in which he resides; he should be a man identified with the affairs of his community; one who has the qualifications of discussing and teaching; a believer in the virtues of the law; he should be possessed of sufficient executive ability to administer the law with the least friction possible; he should possess the faculty of getting along well with his competitors.

In the early operations of the law local registrars, of course, must become the teachers and instructors of the people relative to its application and as to how its various requirements shall be met. A local

registrar possessing the qualifications just enumerated is not only able to have from the people the legal compliance to the law, but he will obtain from the people their moral support in its enforcement.

In the enforcement of this law a local registrar, by realizing his moral obligations and acting on these, is able to obtain fully as much success as he is able to obtain by a full realization of the legal obligations he has assumed.

In selecting a physician as local registrar, the medical profession of the community is more actively interested in the law and at the same time the profession is caused to feel a greater responsibility in its satisfactory and complete application.

Medical societies, as a result of thus recognizing the profession, are caused to make the subject of vital statistics a special portion of the program at the various meetings. We believe that a closer union of the profession in working for the public health thereby results.

Often in sparsely settled sections of the State, a physician who is local registrar of a district is the only physician in that community. In view of this fact, he, at first hand, has direct knowledge of all births occurring in his district, as well as all deaths occurring. This would not be true did a layman serve in the same capacity, either in a sparsely or densely settled district.

Where, for certain reasons, it is impossible to secure a physician to serve as local registrar, and where in certain districts no physician resides, the selection of a layman as local registrar becomes a necessity. I do not believe that the rule should be followed that this layman should be one filling some minor office, such as justice of the peace, etc., but he should be an intelligent man, representative of the citizens of the community in which he resides. He should always be accessible to the people and possess the other qualifications, so far as possible, which a physician possesses, outside, of course, of any knowledge of medicine and surgery.

The qualities of a vital-statistics law are no stronger than are its various features administered in the districts constituting the State's area.

The matter of administration in its final application rests probably more heavily upon the local registrar than upon the State registrar, the duties of the last-named officer consisting largely of defining and declaring the policies of administration and supervising the office details of the central bureau.

DISTRICTING THE STATE.

As an early step in the organization of the bureau of vital statistics, the fixing of boundaries of registration districts demanded attention.

The Missouri law requires that each incorporated city and town shall constitute a primary registration district, and provides further

that portions of each county lying outside of incorporations shall, by boundary lines designated by the State board of health, constitute primary registration districts.

In creating our districts we have followed the rule of adding to districts composed of incorporated towns and cities such rural sections as lie convenient and adjacent to the incorporations.

We have further followed the rule in sparsely settled sections of the State of assigning in some instances as much as two or three townships not containing a commercial center to some important commercial center of that particular county.

Missouri is subdivided into 114 counties and 1 city, the city of St. Louis, which occupies the status of a county. These 114 counties are subdivided into minor civil divisions termed "townships." There are some 1,280 townships in the State. There are in the State some 664 secondary divisions comprising 294 cities, 32 towns, and 338 villages. These secondary divisions, practically in all instances, form part of the townships in which they are located, so it is readily seen that with the 1,150 local registrars we have almost one local registrar for each township in the State.

We are strongly of the opinion that small districts are essential to the satisfactory operations of the vital-statistics law, and do not concur in the opinion of others that in a mountainous or sparsely settled section of a State it is unnecessary to have small primary districts and a consequent small number of registrars. But, on the other hand, we believe small districts are essential in the satisfactory administration of the law. We believe that the number of registrars should be largely based on the area of the territory rather than on the population.

OFFICE SUPPLIES.

Each and every detail in the equipment of a bureau of vital statistics must be given thoughtful consideration. The character and printing of blanks and forms is worthy of careful thought.

A better impression is given one of the nicety of exactions when it is observed that blanks and forms are well prepared and show some thought in their preparation.

Missouri, I believe, was the first to put into practical use the present standard death certificate.

A short time prior to having our forms printed I learned through a press report of the adoption of a new standard death certificate. Upon writing to Dr. Cressy L. Wilbur, Chief of the Bureau of Vital Statistics at Washington, I was informed of the correctness of this report, and he furnished me with forms just off the press. These we

followed, and, as above mentioned, introduced them not only in our own State but were the first State to use same.

With the State districted and the appointment of local registrars made, the placing in the hands of these officers of full sets of supplies, together with detailed statements as to their use, is the next step.

I do not know that Missouri excels any other State in the character of its printed forms and supplies for local registrars, but, nevertheless, we feel considerable pride in our printed matter. For your inspection I here submit blanks and forms used by our bureau. A pamphlet containing the law, together with full and complete instructions consisting of an annotation of every section of the law, with a copy of the International Classification of the Causes of Death appended, is a publication that has served us most satisfactorily.

It has been our experience that certain local registrars and others called upon to comply to the law have been unable to put a proper construction upon the various provisions of the statute. For this reason we have found it necessary to publish instructions upon these questions somewhat at length.

Shortly after placing full sets of supplies in the hands of local registrars we began the publication of a circular letter. This was put out about every three or four weeks, dealing with the provisions of the law and informing the local registrars as to how progress was being made in the State with reference to its administration. We have felt that by thus keeping in close touch with the local registrars through frequent circularizing and letter writing a greater interest in the workings or operations of the law was developed.

The installing of a law in a State does not constitute exclusively the carrying out of certain of the plain provisions of the law, but the scheme of securing perfect and complete reports is a necessary part of the law's installation as well as its operation.

For the first six months during the operation of the law we were not overexacting in our demands for a close adherence to the International Classification of the Causes of Death and for uniform statements relative to the item "occupation." We preferred, first, for the people and the officials to become thoroughly acquainted with the provisions of the law and certain of its plainer details and operations before insisting too strongly concerning the items above mentioned, but after some six months' operation of the law we then became very exacting with reference to the two data on death certificates, "cause of death" and "occupation."

All certificates returned to the central office upon which the cause of death does not conform to the International Classification are copied upon supplementary blanks and returned to the local registrar in order that he may have the certificate perfected.

Rather than go into detail as to our method of obtaining this complete information, I prefer to pass among you forms that are being used for correcting certificates. The typewritten statements attached to these forms will readily explain their method of use.

PUBLICITY.

The successful administration of a vital statistics law in any State depends largely on the publicity given it. In our State the matter has been discussed at the county medical societies and in the State medical association, and the physicians are a unit in support of the law.

By giving frequent statistical compilations to the press we have received the support of the newspapers of the State and the support of the various civic bodies which are naturally interested in matters of this character.

Our early experience in Missouri was to find a large percentage of the population of more than three and a quarter million wholly unacquainted with the necessity and virtues of a vital statistics law.

People failed to understand why they could not continue to bury their dead as they had in the past, without furnishing to an officer family and personal particulars leading to the obtaining of permission to make burial or other disposition of the body. They did not understand why the cause of death should be a matter of public interest.

With equal deficiency in understanding people wondered as to why children could not be born as in the past without making the parentage and other data a matter of public record. The future value of such information was not realized.

It is true that three or four of our cities had under municipal ordinances such a law in operation. Outside of these cities and in the rural sections of the State a good deal of ignorance concerning the necessity or worth of such a law existed. Naturally, people were more or less refractory in the matter of complying with this exacting statute, which reached every family in the State. A feeling of rebellion was encountered in some communities and in others compliance to the law was had with reluctance and no little protest.

Wherever we found an individual who was opposed to the law from any cause, or who declined to observe it, we immediately wrote a personal letter to such a party. This resulted in a correspondence over the State consisting of from 50 to 75 personal letters per day for the period of a number of months.

I will say that the matter of personal letter writing along such lines has now ceased to exist, because the necessity no longer prevails.

Early in the operation of the law we availed ourselves of the use of the public press. Papers published in the large cities and the small

weekly papers of the counties were made use of. We had published short and pointed articles explaining the law and pointing out to the public its virtues.

We began early and have since followed the plan of furnishing some 500 weekly newspapers of the State a monthly statement concerning the births and deaths of the respective counties in which each paper is published. The births have simply been reported by number per county, while the deaths reported have been under 24 causes, among the 24 causes, of course, being all of the infectious or contagious diseases.

By means of the public press we have been and are now furnishing information to people of all the counties of the State in order that they may have statistics that are of importance, and by studying these they are enabled to ascertain the prevalence of communicable diseases in a community. As a result people are made to see many of the reasons for such a statute and the public is stimulated to better control of contagious diseases and are caused to see the many legal purposes death and birth certificates afford.

As a result of our furnishing the newspapers of the State with this statistical information, upon request coming from us, these papers have placed our office upon the exchange list. We receive from four to five hundred papers weekly. From these papers clippings are made. These clippings are used for the purpose of checking the index, thus giving us information as to whether or not all births and deaths are being reported.

As stated in the early part of this paper, the law was installed in Missouri March, 1910. During the first complete year's operation of the law, or for the year 1911, we secured birth certificates to the number of 73,858, or 22.42 per thousand population. The total of deaths for this same year was 43,390, or 13.17 per thousand population, the figures based upon the census of 1910.

From these figures, it therefore seems that we are probably securing more than 90 per cent of the deaths, and I believe that nearly this same percentage of births are now being reported.

PREPARING FOR THE OPERATION OF THE MODEL VITAL-STATISTICS LAW IN VIRGINIA.

W. A. Plecker, M. D., Director, Bureau of Vital Statistics of Virginia, Richmond, Va.

Both the passage and the enforcement of the new vital-statistics law in Virginia were beset with difficulties. Several attempts to enact such a law had met with failure, and when a new effort was made in the assembly of 1912 the opposition of many legislators

had to be overcome. Not until the law had been amended from its original form was its enactment possible, and not until the appropriation necessary for the work had been reduced by half could the necessary votes be had.

Much more difficult, however, was the enforcement of the law, and for four well-defined reasons. These were:

First. The inherent objection of the people to any interference with what they deemed their rights.

Second. The sparsely settled character of much of the country in which the law was to be enforced.

Third. The creation of registrars by statute in unnecessary numbers and in unsuitable locations.

Fourth. The lack of means for aggressive organization.

A word about each of these obstacles will explain the method of work. Virginia is a State with a minimum percentage of foreign-born citizens and with comparatively few immigrants from other States. Reared in the locality where their forbears lived for generations, the citizens of rural Virginia have very well defined conceptions of their rights.

Liberty of thought and freedom from the interference of government are the inherited and most cherished traditions of the southern people, and particularly of Virginians. They had little theoretical objection, to be sure, to recording births and deaths, but many of them very strenuously objected to being required by law so to do. They had always buried their dead in the manner and at a time suited to their own convenience, and, in some instances, could not see why the State should dictate to them in these respects.

The difficulties to be overcome on account of our sparsely settled country will hardly be appreciated by those who come from thickly populated States with ample means of transportation. Virginia's population is but 2,061,000, and these are scattered over an area of 40,262 square miles, the average population per square mile being 51.2. This of itself constitutes a problem of no small proportions, but a bad situation is made worse by difficult roads, steep mountain ranges, and numerous watercourses.

With this obstacle should be included the fact that we had a previously located and almost inflexible supply of local registrars. The statute provided that the local justices of the peace in the counties should act as registrars and that all justices should be appointed. There were some 1,400 of these justices, most of whom were grouped about the small towns. How to divide the district among the registrars and how to provide for those areas where there were no justices was a problem that seriously threatened the enforcement of the law.

A final obstacle, and one the force of which is apparent, was the scanty appropriation placed at our disposal. The law as finally

passed required that the expenses of the work be paid from the general appropriation to the State board of health and that the amount expended should not exceed $5,000 the year. From this sum had to be paid the expenses of the various assistants, printing, and postage. The fees of registrars were chargeable against the counties.

This last obstacle made it impossible for us to begin work until within two weeks of the time when the law became effective. Such work as could be done by the regular officers of the board of health and by the assistant registrar then at work in the field was accomplished, but this was small in proportion to what had to be done.

Reviewing the various steps taken in the enforcement of the law, despite these difficulties, the writer does not see where our efforts differ from those in other States, except in respect to our educational work. We used the standard forms with a few modifications; we appointed our registrars, had them divide off the territory, and mailed them the regular supplies; we communicated with the physicians, midwives, and undertakers, and asked their cooperation; we settled the disputes among the registrars, tried to make a dollar do the work of five, and appointed registrars or subregistrars as fast as we could. But all of this has been done, though generally with better facilities and more money, in other States. Only in respect to our publicity did we do anything particularly original, or, I take it, especially interesting to the delegates. A brief review of our preparations along this line may be of some service.

To show all the people as often as possible precisely how important the law was to them and how it would operate to their interest was our task. The physician, the undertaker, the midwife, the registrar, and the citizen alike had to be educated.

Fortunately, we had at our command the publicity bureau of the State board of health, which is on friendly relations with the daily and weekly press and which issues a monthly bulletin. For almost three months the entire publicity work of the department was devoted to vital statistics.

As a campaign document we printed and distributed a large edition of a special bulletin entitled "Why Births and Deaths are to be Recorded in Virginia." This was a detailed argument in behalf of the new law, and was accompanied by a reprint of the statute itself. The chief argument advanced was that the record of births and deaths was essential to safeguard the interests of the individual and was of vital importance to him. The legal importance of such records was next emphasized, then the social and demographical worth of vital statistics, and, incidentally, their value to public-health work. This line of argument we have pursued ever since. The self-interest of

the individual rather than the benefit to society has been the basis of our appeal.

While this bulletin was being circulated we sent out weekly notices to the newspapers of the State, setting forth the importance of birth and death certificates. As it happened, a few instances had recently occurred in Virginia where litigation, confusion, and loss had resulted from the absence of legal records of births, and we made the most of these. A Virginia negro in Roumania, a self-styled "music-hall artist," had been unable to marry because he could not produce a birth certificate; a well-known citizen had died in Central America and his estate had been in litigation because no death certificate could be had; a Virginia court had struggled for years to ascertain "How old is Ann," a question that has since become a proverb. All these things received due emphasis in a hundred papers weekly, with the result that most of our people, whether they so desired or not, were educated regarding vital statistics.

When the time came for enforcing the law we made our particular appeals to the various classes who would participate in the enforcement of the law. The National Undertakers' Association had put themselves on record as favoring the law, and our Virginia branch was urged to support the national body. Our physicians were shown how a proper record of births and deaths would help them, and were admonished that their observance of the law was a part of their professional duty. Our midwives—many of them ignorant negroes—were courteously informed that we looked to their honorable calling for support and sympathy. Last of all, our registrars were schooled and drilled in their work.

To the instruction of the last-named class particular attention was devoted. They began to send in hundreds of questions from the day their appointments were received, and in some cases they professed despair at the complicated character of their duties. To answer all of these questions was, of course, impossible, consequently we prepared and issued two editions of a bulletin in which we set forth the exact manner in which every duty must be performed, and precisely the routine to be followed in every instance. These regulations were all numbered and supplied with suitable captions so that the registrar, in doubt, had only to consult his directions. It may not be amiss to notice that the forms issued the registrars were all numbered, so that a regulation to copy the original of No. 16 in a page of No. 18 had a specific meaning.

In like manner we sent each registrar a number of placards advertising the law and notifying the public that he was prepared to issue permits and to receive certificates. The first placard issued was an appeal to the average farmer, who was urged to register the birth of

his children and the death of his parents, inasmuch as he thought enough of his thoroughbred stock to register them. The second placard asked the question, "When is your birthday?" and proceeded to show how difficult it was to prove an exact date. We have found these very helpful.

Again, during the progress of the work much newspaper publicity was given to the various records. The first recorded death was announced in all the papers. The proud parents of the first children reported—twins, as it happened—had their names and history printed in all the papers. When the first month's statistics were numbered and bound the public was congratulated upon its splendid appreciation of the new law.

More recently still, to meet an obvious demand, we have printed a bulletin in which we have set forth at some length the location of every registrar in every county of the State. This bulletin has been sent the registrars, the physicians, and the undertakers, and is available for distribution to those desiring it.

It is of course too early to forecast the results of our work or to indicate what we may expect as the rewards of our labors. We estimate, however, that we are already receiving nearly 90 per cent of the deaths and births.

We are hoping, and are working, in short, for the best, and look forward to the time when we may be admitted to the registration area.

If, in conclusion, I might say a word to those from States which contemplate the enactment of vital statistics laws, and particularly to those from the Southern States of this country, it would be this: Upon effective and constant publicity depends our ability to overcome the inherent opposition of the people to measures of this sort. Here, as everywhere, education is the open sesame of progress.

VITAL STATISTICS IN LOUISIANA.

OSCAR DOWLING, M. D., President Louisiana State Board of Health.

CONDITIONS AND PROSPECTS.

The registration of vital statistics in this country is dependent on the enactment of adequate laws by the legislature of each State and enforcement by the authorities charged with that duty.

If there is no provision by the State for the collection of these statistics, registration may be conducted under municipal ordinances.

In 1911 there were 22 States accepted as members of the registration area on the basis that they have fairly accurate reports of at least 90 per cent of all the deaths that occur. Since then Kentucky has been added to the list.

In legislation, Louisiana ranks among the States foremost in this effort, the model statistics law having been adopted by the State board of health in January, 1911, and the same approved by the enactment of the legislature in session of 1912.

Since May, 1911, a registrar has been in charge of the work under the direction of the secretary of the State board of health.

There are now in the State 61 organized local units called "Parishes," the corresponding term to county in other States, and about 250 incorporated communities. Returns from 21 parishes and 22 cities and towns were received and recorded during the month of July, 1912. It will be noted that after 14 months of definite, persistent effort on the part of the registrar, not one-third of the State can be considered in the State registration area. Nor can the reports be considered accurate.

The fundamental causes of slow progress are the apathy of the people in general and the peculiar sociological condition which obtains in Louisiana. There is also a financial reason. No money to pay local officers was available until the passage of the act of the legislature in 1912. A specific and certain fee for the local officer is imperative.

Statistics of this kind seem, even to the educated, unimportant. The legal, sanitary, and demographic uses of such figures are not known, and their possible value in the individual life seems very remote. Hence there is no desire to aid local or State authorities in getting records, complete or incomplete. A health officer writing to the board is frank enough to voice the prevailing opinion in these words: "This blank is foolishness. I have no time for such."

In Louisiana, as in many other States and countries, the indifference of the public must be accepted. To change the point of view and convince the people of the economic and social values of this information is the responsibility of the health administrator and his coworkers.

In our State, the character of the people is an important factor. In her historic aspect Louisiana stands unique. The period of French exploration and domination with the glitter of sword and shield, and manifest romantic loyalty to the mother country; the 40 years of Spanish rule by the age-long rival of France with equal love of conquest and desire for power; and the coming of the "American" from the frontier largely, temperamentally, and in aims and purposes, different from those in possession, form the warp and woof of her early romantic history.

These influences persist. The Creole of to-day inherits the free, hospitable, pleasure-loving spirit of his aristocratic antebellum forefathers; the masque and the pageant please as in the days of chivalry and romance. The Anglo-Saxon, steadfast and sober-minded,

adheres to the contemplation of the serious issues of life in harmony with the struggles and traditions of his Huguenot or Puritan ancestors.

These types are as marked as the physical features of the sections where they dwell. In the sunny prairies of south Louisiana life seems a pleasant dream; among the red hills of the north, amidst lordly oaks and pines, nature makes the call for a more sober spirit.

In one particular fusion is complete; that is, in loyalty to the American flag and pride in the principles for which it stands. The national fête day of France is kept with patriotic fervor by citizens of French descent, proud of their heritage, but with no thought of disloyalty to the Stars and Stripes.

Yet, differences in temperament, customs, and habits of thought and living obtain. Even now, though it is many years since English was made the language of the public schools, a campaign orator on the border line finds it advantageous to give his speech in English and again in French. But since April 30, 1812, the patriotic loyalty of the citizen of Louisiana has not been doubted.

The large negro population of the State, in some sections 8 to 1, is an important racial element.

Notably irresponsible, careless of family ties, and ignorant of property rights, the negro can not understand the necessity or advantage of registration of a birth or death. Whatever is done with the majority of this race within the next 30 years will have to come through strict supervision and the aid of the courts.

In the adjustment of methods to conditions, means of communication form an important feature. Louisiana, in common with many other States, is just beginning to realize the economic value of well-built highways. In portions of the State roads during the winter months are sometimes impassable, at all times difficult. With the registrar perhaps miles away, it is not surprising that a report of the demise of a loved one, or a burial permit, seems far less imperative than immediate arrangements for decent burial in the little country churchyard, itself miles distant. What significance in days of joy or sorrow can a blank have, sent out by some authority in a far-away city? And the questions, they seem unnecessary and, perhaps, a bit impertinent, going so deeply into the family records. "Why should we bother? Those doctors who send them out have nothing else to do."

Then, among the large and faithful Catholic population, the kindly father makes always a baptismal record. Isn't that sufficient? While not true of all, this is the attitude of a large number of people who live in sparsely settled districts and among whom there is not apparent the vital need for protection that clearly exists in urban centers.

There is an historical reason also for this prevailing temper of mind in rural districts and even in towns and villages. Until 1898 there was no board of health charged specifically with the duty of the State work alone. The board of the city of New Orleans had direction of all health activities. Naturally with limited funds, and, as conditions were, particularly with reference to quarantine regulations and constant dread of yellow fever, it was impossible for the board of health to do more than meet the imperative demands of the city. Hence, no organization of the local units was attempted in respect to vital statistics. This means that in the common consciousness there is no foundation for a sense of responsibility in the matter of records, and implies the need for all the agencies characterized as educational.

From this brief analysis the essentials of the problem in Louisiana are, clearly, diversity in temperament, hence in ideals and habits of the people; a large irresponsible element in the negro; a marked difference in the physical features of the State; a lack of preparation for serious consideration of this phase of health effort; and, equal in importance, only a very limited fund with which to push the work.

Our difficulties are inherent in the social structure, and their solution will depend on an intelligent appreciation of the practical value of authentic records to the individual and the Commonwealth.

For two reasons the need in Louisiana for reliable figures is more imperative than in many other States.

First, a naturally healthful environment has been misrepresented and maligned, due in part to former epidemics of yellow fever and in part to a mistaken notion as to our swamp areas. From personal investigation and observation of conditions in every parish in the State, the conclusion is warranted that the healthfulness of this region is unsurpassed. Climatic conditions, water, variety of food products, and nature's enticement to open-air activities make for physical vigor and consequent longevity. But to prove these facts and, in addition, our relatively great immunity from many diseases, accurate, specific records are essential.

The use of simply the crude death rate as an argument for salubrity of a city or town is no longer pardonable. It does not convince the thinking man. Complete statistics only are effective. A consciousness of this is dawning. As in the past, it is based partly on the demands of commercial interests, always effective agents in the remedy of sanitary defects. When business men become convinced of the economic value of vital statistics, there will be established effective machinery for the collection of this information.

For the future welfare of the Commonwealth, accurate records of births and deaths and their correlatives are fundamental. The details included in the model law are invaluable in the determination of facts

pertaining to racial deterioration or increase in bodily stamina, the prevalence of insanity, and many other aspects of community life.

Where there is racial diversity as marked as that of the whites and blacks, these observations are a necessity, that the State may know of possible pitfalls ahead, or feel confidant that all is well.

In Louisiana, though there are many discouraging features in the general situation, the outlook in this, as in other aspects of hygienic work, is hopeful.

The law is adequate. It provides the necessary official and legal machinery and contains an effective check upon the accuracy of the registration of births and deaths.

Authority is not lacking. The State court of last appeal ruled on June 4, 1912, that the State board of health has authority to enforce the rules and regulations of the sanitary code.

The budget item for the work of the board was increased. While the appropriation is inadequate, the small extra amount gives hope that within two years imperative needs may be felt, and at the next biennial session of the legislature a sum may be appropriated sufficient to extend systematically the work that is now initiated.

It is also encouraging that there are public-spirited, progressive physicians in the State who are helping in their respective localities to enforce the rules adopted by the board and sanctioned by the legislature.

On the part of the public there is a growing determination that the health department shall be freed from political domination. When controlled by a faction, the administrative and working force lack stability. They are likely to be slow to take the initiative and derelict in enforcement of the law. This has become apparent in a measure at least to the voter and there is a decided note of protest.

Efficient officers and continuity of purpose are the requirements for successful public service. In health work, preeminently, honesty of purpose, fearlessness in enforcement of the law, and untiring vigilance are essential. Officers of this character can be secured and retained only when free from political interference.

The signs of the times induce a spirit of optimism even in relation to the establishment of an orderly and authentic system of records. But most encouraging of all is the general awakening of the people to questions sanitary and hygienic. For two years an active educational campaign has been in progress, initiated and conducted by the present board of health. Results are forthcoming.

There is a lively interest in many things relating to health where formerly there existed only indifference. This is fundamental in any reform—the desire of the people themselves to bring it about and from their own realization of its value.

When the productive character of this work for the community is understood and value to the individual of proper records of the vital events of life is comprehended, cooperation of the people and the authorities will develop and become concrete in adequate machinery and willing effort to comply with regulations.

In many lines of progress to make haste slowly is wise. In this effort, while using every possible means to convince, educational agencies should be permanent.

IMPROVEMENT IN BIRTH REGISTRATION.

Dr. Eugene H. Porter, Commissioner of Health of the State of New York, Albany, N. Y.

[Abstract.]

Dr. Porter discussed progress made by the State Department of Health of New York in improving the registration of vital statistics since 1900, and referred mainly to the registration laws of this State. The laws of the State require local boards of health to supervise and make complete the registration of all births and deaths occurring in the territory under the jurisdiction of the local boards. The State is divided into 1,435 registration districts—932 towns, 454 incorporated villages, and 49 cities—each maintaining a separate board of health. Physicians are required to report deaths promptly and the undertaker having charge of a corpse is required to file the certificate of death with the local registrar of vital statistics and obtain a burial permit before removing a corpse for burial. Certificates of births are required to be filed with the local registrar within three days after the birth occurs. Local boards of health are empowered to adopt and enforce sanitary regulations requiring compliance with the registration laws, fixing a penalty for violation thereof of a sum not to exceed $100. The usual penalty prescribed is $10 for each offense. When known defects exist in any registration district the State commissioner of health is authorized to send a representative to take charge of the local registration if after serving a formal notice on the board to correct existing defects within 10 days from date of notice such defects are not amended.

The State department of health is authorized to step in and enforce the law only in such cases as bring to attention flagrant violations of the law. This is the weak point. Lack of funds prevents strict enforcement of the law. It is hard to estimate the true birth rate of any large municipality or State, but it is safe to say that the registration of deaths in the State of New York is practically complete, and that the registration of births is within 10 per cent of being complete. But few births attended by a physician escape registration now, and the contention is to see that births occurring without

medical attendance are registered. To gain this end we are trying to obtain the cooperation of the clergymen by having them ascertain at time of baptism whether a certificate of the birth of the child has been filed with the local board of health, and if not to notify the local registrar so that he may see that the birth is properly recorded.

At the present time only about 6 per cent of the births occurring in New York State escape registration, whereas in 1900 it is estimated that over 20 per cent were not reported. There were 221,434 births and 145,776 deaths reported last year in New York State. During the past two years there has been a marked decrease in the general death rate, and this decrease is associated with the reduction in infant mortality.

THE RELATION OF RURAL AND URBAN POPULATIONS AS SHOWN BY THE CENSUS IN THE UNITED STATES AND CANADA TO PUBLIC HEALTH PROBLEMS.

Dr. Peter H. Bryce, Chief Medical Officer to the Bureau of Immigration, Department of the Interior, Ottawa, Canada.

I desire to direct your attention to the two tables in the following diagram showing the total populations and their increases in the United States and in Canada during the last census periods, and the rate of urban and rural increases in each, and their relation to each other and to similar tables in previous census periods.

TABLE 1.

	Population of the United States.				Percentage distribution.			
	1910	1900	1890	1880	1910	1900	1890	1880
Total	91,972,206	75,994,575	62,947,714	50,155,783				
Rural	49,348,883	45,187,390	40,227,491	35,383,345	53.7	59.5	63.9	70.5
Urban	42,623,383	30,797,185	22,720,223	14,772,438	46.3	40.5	36.1	29.5

Total increase of United States 1900–1910, 21 per cent.

Total rural population, 1900	45,197,390
Total rural population, 1910	49,348,813
Actual increase in census period	4,151,423
Estimated natural increase at 1.2 per cent per annum	5,423,686
Total urban population, 1900	30,797,185
Total urban population, 1910	42,623,383
Actual increase in census period	11,826,198
Estimated natural increase at 1.5 per cent per annum	4,619,528
Total United States immigration in 10 years, 1901–1911	8,789,386
Estimated immigrant farmers and farm laborers, based on data of 1911	2,636,815
Estimated rural loss without allowing for any natural increase in rural immigrants	4,656,815

Immigration to the United States, by years:

1901	487,918
1902	648,743
1903	857,846
1904	1,020,499
1905	1,020,499
1906	1,110,499
1907	1,285,249
1908	782,870
1909	751,786
1910	1,041,570

TABLE 2.

	Population of Canada.				Percentage distribution.		
	1911	1901	1891		1911	1901	1891
Total	7,204,838	5,371,315	4,833,239	Rural	54.4	62.3	67.9
Urban	3,280,444	2,021,799	1,537,089	Urban	45.6	37.7	32.1
Rural	3,924,394	3,349,516	3,296,141				

Total increase for all Canada, 1901–1911, 34 per cent.

Total rural population, 1901	3,349,516
Total rural population, 1911	3,924,394
Actual rural increase in census period	575,878
Actual percentage of rural increase	17.6
Estimated natural increase at 1.2 per cent per annum	401,941
Total urban population, 1901	2,021,799
Total urban population, 1911	3,280,444
Actual increase in census period	1,258,645
Actual percentage increase	62.5
Estimated natural increase at 1.5 per cent per annum	303,269
Total immigration to Canada, 1901–1911	1,715,326
Estimated farmers and farm laborers, based on 1911 (at 30 per cent)	514,597
Estimated rural loss without allowing for natural increase of rural immigrants	340,660
Canadian immigration by years:	
1901–2	67,379
1902–3	128,364
1903–4	130,331
1904–5	146,266
1905–6	189,064
1906–7	124,667
1907–8	262,469
1908–9	146,908
1909–10	208,794
1910–11	311,084
Total	1,715,326

In a paper in section 7 I have dealt with the question of the distribution of immigrants after arrival, so need do no more here than point to the results in both countries.

What is abundantly apparent in Canada, even more than in the United States, is that, in spite of every organized effort on the part of governments to place immigrants on the land, the total outcome of rural immigration in Canada in a total immigration in 10 years by seaports alone of 1,114,802 plus an additional 524,852 in nine years from the United States has not equaled what the natural increase of the population of Canada in 1901 was at a rate per 1,000 of 1.2 per cent per annum. Thus:

Population of Canada in 1901	5,371,315
Increase by 12 per cent	644,557
Rural increase in Canada in 10 years	574,878

When it is realized, on the other hand, that while the total population increase in Canada in 10 years was from 5,271,315 to 7,204,838, or 34 per cent, the total urban increase was from 2,021,799 to 3,280,444, an increase of 1,258,645, or 62.25 per cent, the nature of the dislocation of population in Canada will be understood and the nature of the problem before us appreciated. Further, the number of immigrants who in 10 years entered Canada, giving their vocation as farmers and farm laborers, was 619,955. Canadian cities, with a total of 2,000,000 in 1901, have in practice had to absorb 125,000 per annum, finding employment for them, housing for them, education for them, and have had to undertake the task of Canadianizing and policing the foreigner and especially of caring for the health of many thousands to whom the social life of towns was unknown, or who had to be prevented from creating slums similar to those they had escaped from. Similar figures for the United States, as given in the tables, illustrate the immediate effects upon health.

Illustrating the relationship between slum populations and insanity, Dr. Mott, pathologist to the metropolitan asylums of London, in a paper recently presented before the Royal Sanitary Institute, gives a table of the pauper lunatics of London by parishes. They ran from as low as 2.6, 2.8, 3.5, in the best, to 8.1, 9.2, and 12.7 per 1,000 in the poorest and most crowded parishes. Dealing with prevention Dr. Mott said:

> If it can be shown that there is a correlation between insanity, tuberculosis, alcoholism, syphilis, and overcrowding in one-roomed premises, and insanitary dwellings in our large cities, it might be asked whether public money would not be better expended in solving the housing problem than in spending vast sums on sanatoriums and lunatic asylums in the hope of dealing with physical and mental degeneracy.

Yet another set of figures depending directly upon the former is found in the prices of foods.

In England the increase in prices of the chief foods of the people, as seen in the following table, has been taken from the London Daily Chronicle, July 17, 1912, and serves to illustrate how her posi-

tion enables her to minimize, in the matter of food prices, the evils springing from the industrialism of her cities:

Increase in food prices in—	Per cent.
United States	29
Canada	27
France	20
Germany	40
England	5

If foodstuffs alone are taken, the increase in England is but 2 per cent.

Many other facts might be given to illustrate a state of affairs which has existed and still exists in other countries, which have developed rapidly along similar lines; and it is obvious that from the sociological and economic, as well as public-health standpoints, these figures are fraught with a meaning to which it is idle for us to shut our eyes. We have, in Canada, been so accustomed to viewing England as the country whose lead we should follow, that it may not seem unnatural that we should wish to emulate her in the growth of our cities, which increased by 1,258,645 in 10 years. It will not be forgotten, however, that England's position as the workshop of the world, and the transporter across seas of the great bulk of the world's ocean-going commerce, has given her an unique position in the world, and with her lands so largely already occupied it was not unnatural that the growing industries should lead to a dislocation of her population so that in 1911 there was an urban population 62.5 per cent greater than in 1901.

Similarly, in the United States, it was not unnatural that the small State of Massachusetts, poor from the agricultural standpoint, should with a growing West have become the Manchester of the New World; neither is it wholly unnatural that the cities of the older Provinces, Quebec and Ontario, should have rapidly grown to become the industrial centers for the growing West.

The pity of it all is that from the physical and economic standpoints there should and indeed must follow those evils which have grown out of industrialism everywhere, and which, as in England to-day, are taxing the thought, energies, and financial resources of the people to an extent which we in a new country are as yet unable to appreciate. That England is endeavoring successfully to cope with her problems in a manner unequaled ever before, and after a manner worthy of her highest traditions, does not make it any the less incumbent upon us that we endeavor to realize what lies before us and to take such steps as may yet be possible to minimize the evils which are growing apace.

Before dealing with some of the preventive aspects of our problem, it will be proper to refer to some of the conditions which have grown

up with industrialism, and I shall refer briefly to what are illustrated by the most exact statistics of England. Sir James Crichton Brown, F. R. S., in June last declared open a new mental hospital in Cheshire. In his speech he referred to modern social conditions in reference to insanity. He said:

It is, I think, with mixed feelings that we take part in the ceremony such as that which has brought us together to-day. We must deplore the fact that such institutions are necessary. In sanguine moments we, those of us of sanguine temperament, may perhaps look forward to the time when there will be no further call for lunatic asylums in this country. As regards another group of diseases, those included under tuberculosis, the cure is in sight.

But as regards mental and nervous diseases which depend not on any specific microbe with which it can grapple, but in a multiplicity of insidious causes, our mastery over them is remote, if indeed it ever comes before the millenium. The risk is that these mental and nervous diseases may make fresh encroachments and strengthen their hold on us.

The broad fact remains that the number of registered lunatics has increased enormously and is still increasing.

From 1859 to 1910, or 50 years, the notified insane had increased in England from 32,762 to 153,157, or by 262 per cent, while the population has increased by only 85 per cent, while, as Dr. Burn says, there has been no increase in the rate of recovery, vast sums have been spent on asylums, medical and surgical science have advanced by leaps and bounds, housing and sanitation have improved, education has extended, the use of alcohol has diminished, and yet the number of lunatics goes on increasing.

The explanation of this is, from any point of view, to be found in the strain and stress of the age in which we live. It will not be disputed that during the last century the possible causes of nervous disturbance have increased prodigiously. The tendency of civilization has been to transfer the burden of breadwinning for the masses of the people from the muscles to the nerves. In the area of competitive business the victory is now to the vivid and to the nervous, not to the stolid and to the brawny. The introduction of machinery into every branch of industry has made life at once more monotonous and irritating and in some industries a policy of "speeding up" has been adopted, which increases closer work and fewer intervals of rest, and is therefore peculiarly exacting and exhausting.

The diffusion of education has widened the periphery from which stimuli of every kind may reach the brain. In response to our ever-shifting kaleidoscopic surroundings, we have become more fitful, mercurial, wayward, and impulsive than we used to be, and suffer more from what may be called "brain fidgets." It is certain that we are more jumpy than we used to be, have to be more on the alert, and so make sharper demands on our nerves, and are prone to those nervous breakdowns that lead up to mental disorder. We have been crowding our people into towns where hustling and nervous agitation are inevitable, we have been bringing up our babies on anything but mother's milk, and by the employment of women in many industries have curtailed that family life in which the young nervous child best gains and thrives. We have been cultivating emotionalism and eargerly pursuing all kinds of pleasurable excitement, while we have narrowed our horizon and lost sight of some of those ideals that helped in the past to maintain a nervous and mental equilibrium. Notwithstanding all our improved economic conditions, we have not yet, as regards the nervous system, succeeded in reconciling modern civilization with biological processes. It is of course only by further economic, social, sanitary, and ethical reforms that the great nervousness of our age is to be abated.

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To supply yet more exact facts, I may refer to a lecture on "Sanity and insanity," before the Royal Sanitary Institute, in April last, by Dr. F. W. Mott, pathologist to the London County Asylum, as confirming Dr. Brown's remarks. Dr. Mott says: "A neuropathic heredity is the most important cause of insanity."

Dealing with the statistics of London insane, Dr. Mott points out what, in my own official work has necessarily been made apparent, especially in British immigrants, that—

There are two very numerous classes of individuals whose conduct is antisocial and who at present are not registered or controlled. They are, first, the chronic, incurable, inebriate, dangerous to himself and society and responsible for a large proportion of the crimes of violence, consequently a perpetual danger to the community.

Secondly, the higher grade imbecile, of feeble will power, slender sagacity and energy, and lack of moral sense. Although the feeble-minded may be met with in all kinds of society, they are especially to be found amongst the submerged denizens of the one-roomed tenements of our large cities.

The sooner the truth of the adage, that a silk purse can not be made from a sow's ear, is recognized the better, seeing that every child in a school for defectives costs the State three times as much as a healthy child. The Royal Commission disclosed the fact that 4.6 per 1,000 of the total feeble-minded population of England and Wales were not registered and are even more numerous than the registered insane. Indeed, so serious a menace to society has the situation become that in the present Parliament of England a bill is being discussed for compulsory dealing with this class.

He further makes the remarkable statement that in districts where we should, owing to improvements and the pulling down of slum property, expect a diminution of pauperism and insanity, there is no decrease, and in many instances an increase.

I have thus expressed my opinion, by extended quotations from two, than whom we know of no greater authorities, and both point to the same phenomena as having the same melancholy results both on the individual and on society. The world has before had periods of what we may call climax. Alexanders, Cæsars, and Napoleons have kept a whole world in awe; but probably never was there the same intensity of action and reaction as in the Napoleonic era, and nowhere can I recall language so acute, so dramatic, so full of anguish as that of Alfred de Musset in The Confessions of a Child of the Century.

Here is his picture:

"During the wars of the Empire, while husbands and brothers were in Germany, and anxious mothers gave birth to an ardent and neurotic generation, conceived between battles, reared amid the noises of war, thousands of children looked about them with dull eyes while testing their limp muscles. From time to time their blood-stained fathers would appear to raise them to their gold-laced bosoms, then place them on the ground and remount their horses.

Never had there been so many sleepless nights as in the time of that man; never had there been seen hanging over the ramparts of the cities such a nation of desolate mothers; never was there such a silence of those who spoke about death."

But further illustrations of the point are unnecessary. The daily life of our cities, as set forth in the yellow journals, completes the picture I have by quotations attempted to describe. In a paper on the better distribution of immigrants I have pointed out that governments, capitalists, and individuals must, by whatever methods, set the tide of population flowing to the land, and where not possible, to minimize by every known means, whether educational, social, or sanitary, the effects of an urban life, whose essential qualities have been fully described and whose effects are obvious to all.

CLASSIFICATION OF THE CAUSES OF DEATH. MODIFICATIONS ADOPTED IN 1909, AND THOSE WHICH MAY BE NECESSARY IN THE FUTURE.

Dr. Jacques Bertillon, Chief of Bureau of Municipal Statistics of Paris.

[Abstract.]

M. Bertillon reviewed the history of the question. Upon the proposal of Achille Guillard, the Statistical Congress of Brussels, in 1853, decided to draw up a classification of the causes of death. This work was done in part by William Farr and in part by Marc d'Espine. Farr classified diseases according to their anatomical seat; d'Espine classified them according to their nature (gouty, herpetic, hæmatic, and so forth). As a result, in our time, the classification of d'Espine appears incomprehensible. That of William Farr is more recent. Unfortunately, the author often deviates from the purely anatomical classification; he has classified general ailments as enthetic, dietetic, diathetic, and so on, uniting under the latter title, for instance, gout (rheumatism is included elsewhere), anemia, anasarca, cancer, gangrene, and other diseases which, to us of to-day, appear fantastically joined together. This part of his work has become obsolete; the remainder is still excellent.

The history of the past should enlighten us as to the future. The most diverse theories concerning the nature of pneumonia are admitted, but there is unanimous recognition of the fact that its seat is in the lung.

Statistics require uniformity in figures which are intended to be comparable in different countries and at different periods. They have need, then, of lasting classifications. They can not possess a lasting classification of the causes of death if that classification is based upon the anatomical seat of diseases.

In 1891 the International Institute of Statistics commissioned M. Jacques Bertillon to draw up one. M. Bertillon founded his classification upon the anatomical seat of diseases, endeavoring throughout to make his headings comparable with those of the chief nomenclatures then in use.

The American Public Health Association, having recognized the necessity for a uniform classification, has agreed to recommend that of M. Bertillon. But that the advances of science might not in the future find this classification to be antiquated and unacceptable, the Association suggested that it be revised every 10 years, the first revision to take place in 1900. This was done; and the second revision occurred in 1909.

This nomenclature is to-day adopted by all the States of North and South America; by all the extra-European countries which compile statistics (notably by the British colonies and by Japan). Even in Europe it has been accepted by the entire western part of Europe (Great Britain, France, Spain, Belgium, Holland), and by several other countries (Austrian cities, Bulgaria, Roumania, Russian cities, and so forth).

The tendency of a great many physicians is to revert in part to an etiological classification, because this appears to them more scientific.

But a statistical classification is not designed to present a summary of general pathology. Its aim is humbler, but more practical. It is to sum up as exactly as possible the thousands of always brief—and often incomplete—answers which physicians inscribe upon official death reports. That alone is the object to be pursued. Beyond that, the statistical tables which present this summary should have as durable a form as possible. For these two reasons the anatomical classification must be adopted.

DISCUSSION.

Director Würzburger, in discussing the paper of Dr. Bertillon, pointed out that the reason the German Empire stood almost alone among the European countries in not having adopted the Bertillon classification, lay in the fact that Germany has long had a classification of the causes of death, and that in 1904, when a conference upon the statistics of causes of death in the Empire was held, they felt obliged to continue the system already in vogue. The differences between the Bertillon classification and the German classification are not very important and relate, in the main, to causes of death characteristic of the first year of life, and so to those which in any case are difficult of comparison, because in all countries a large proportion of them are not certified by any physician.

Dr. Wilbur said that it was especially gratifying that there was present at this meeting of the section the man who had first adopted the International Classification, or, as it is frequently termed, the "Bertillon system of Classifying Causes of Death and Sickness," in the Western Hemisphere. Dr. Bertillon reported this system at the meeting of the International Statistical Institute at Chicago in 1893,

and it was adopted in Mexico, at the instance of Dr. Jesus E. Monjarás, before its adoption by Quebec and before any use of it had been made in the United States. Such a system is absolutely necessary as affording a basis of uniformity for the comparison of international statistics. The International List is now employed by all English-speaking countries (since its recent adoption by Great Britain), by all Spanish-speaking and by all French-speaking countries. It is earnestly to be hoped that Germany and other countries not yet employing it may join with us in the next decennial revision (1919), when all disadvantages now existing in it may be removed by concerted international action, so that we may have a system that will be universally in use.

Dr. W. F. Snow inquired whether the physician's statement (order of terms) could be accepted as a guide to the classification of causes of death jointly returned.

Dr. Wilbur replied that it could not be so accepted until physicians were more generally instructed with respect to the principles of classification and the distinction between primary and secondary causes. Efforts were being made in this direction, through the American Medical Association and other agencies, including the instruction of medical students, in regard to the correct reporting of causes of death, and it would be very satisfactory when the time should come that the medical certificates could be followed in the assignment of joint causes.

Dr. Bertillon, in closing the discussion, said: I am obliged to Director Würzburger for his comments. As he has said, the classification of causes of death adopted by Germany is not inconsistent with the International Classification. By adding together figures contained in the German statistics we can reach totals comparable with those found in the International Classification, but this involves considerable work. So if Germany should in the future desire to adopt the International Classification it could do so without regret, because its statistics would remain comparable.

The German municipal statisticians had already shown their sympathy with the international nomenclature. They had established at Cologne, under Dr. Zimmermann, an office which published the statistics of the various German cities according to the abridged international nomenclature, but this organization was abandoned when the Empire undertook the work.

The German classification includes a large number of headings, many of which are unused. When I drafted the International Classification I thought that unused titles were expensive, insignificant, and so objectionable. That this opinion was warranted has been shown by the success of the international nomenclature, which to-day is used almost everywhere.

I am very glad to recall that our colleague, Dr. Monjarás, was the first to use the international nomenclature, employing it for the statistics of the city of San Luis de Potosi, and that he proposed its adoption by the American Public Health Association. Valuable as the support of this society was, it would not have sufficed to assure the success of the nomenclature without the unwearying perseverance of Dr. Wilbur. It is to him that statistics owe the great benefit of uniformity, and of the valuable information furnished by the international comparisons which have resulted.

TUESDAY AFTERNOON, SEPTEMBER 24, 1912.

THE DEVELOPMENT AND SCOPE OF POPULATION STATISTICS IN THE UNITED STATES.

ROLAND P. FALKNER, Assistant Director of the Thirteenth Decennial Census (1911–12).

As in other countries, political necessities formed the motive upon which our knowledge of the demographic conditions in the United States has been built up. The need for determining the number of the people as a basis upon which to apportion representation among the several States which form the Union finds expression in the Federal Constitution of 1789, which prescribed an enumeration of the people within three years of the adoption of the Constitution and every 10 years thereafter.

The series of enumerations of the people by the Federal Government began in 1790 and has continued in each of the years ending with a zero. From the very start the ascertainment of the number of the people has been combined with the ascertainment of information about the people; in other words, the enumerations have pursued demographic as well as political ends. In the course of the historical development the collection of this information has overshadowed the mere numbering of the people.

Up to 1850 the enumeration of the population was by families and not by individuals. The heads of the families only were noted by name, and the various members were reported under each head of sex and age for which the schedule provided. The effort to make of this species of tally sheet an instrument to gather various facts led to its becoming very unwieldy and to its subsequent abandonment. From 1850 onward there has been a precise record of each person enumerated, and there has been no further effort to gain statistical tables by a summation of the enumeration schedules.

Although the methods pursued before 1850 imposed considerable limitations upon the scope of the population census, there was none the less a considerable growth in complexity of the schedules. The feeling that the census offered an admirable opportunity to gather statistical information found expression in the attempt to gain information upon agriculture and manufactures at the same enumeration. Beginning with 1850, the population schedule assumed a new form, which permitted a far greater development of the questions and the presentation of results, while the subsidiary inquiries grew in

number and importance. With these subsidiary inquiries we are not now concerned beyond noting their existence. There was one, however, which merits passing mention. From 1850 to 1900 the occasion of the census was utilized in an attempt—largely futile—to substitute for the lack of any comprehensive registration of births, deaths, and marriages and statistics on the movement of the population a direct questioning as to the deaths which had occurred in the census year. It was assumed that the survivors could give accurate information in regard to all deaths which had occurred in their respective families within the preceding 12 months. The persistence of this effort for a period of 50 years represents rather an appreciation of the importance of vital statistics than an overweening confidence in the statistical results gained by methods so crude and inadequate. As a preparation for the movement toward a proper registration of births and deaths, more fully treated by other speakers, it may be that these incomplete and unsatisfactory vital statistics had their uses. Under present conditions the function of the Federal Government in the matter of vital records is confined to assembling and presenting in a uniform manner the statistics gained from the registration conducted under State or local authority.

The first census, of 1790, took cognizance in a rather crude form of the demographic elements of race, sex, and age. It is complete only in the matter of race and permits from the start the distinction between the white and the colored. The care with which this distinction is carried out grew out of the political necessity of ascertaining the number of slaves, but the distinction among free persons of whites and "all other free persons" must be looked upon as a tribute to demographic science.

No other distinction of race appears in the census until 1870, when provision was made for Chinese and Indians. What happened to such persons before that date must be left to conjecture. Undoubtedly very few were enumerated, as there were few Chinese in the country, and the Indians not taxed, and therefore not included in the apportionment of representation, were excluded altogether from the census until 1890. In the same year the Japanese appear as a separate race for the first time.

The closely allied subject of nationality or country of birth made its first appearance in the census schedules in 1820, not without a political significance, as the only thing which it was then sought to ascertain was the number of unnaturalized foreigners resident in the United States. The same question reappears in 1830 but is absent in 1840. In 1850 and in all subsequent censuses the enumeration has been more comprehensive, noting the place of birth for every person enumerated. In 1870 information was asked as to parentage, whether father or mother was born abroad. In 1880 to the exact

birthplace of the person enumerated was added that of the father and mother, and thus a foundation was laid for parentage statistics.

It has been noted also that the census of 1790 took cognizance of sex, but not completely, since only the free whites were distinguished by males and females. Not until 1820 was the sex distinction made in the case of slaves and of free colored persons. The census of 1790 took slight cognizance also of age, as it distinguished free white males of 16 years of age and upward from those under 16 years of age. The censuses of 1800 and 1810 made age distinctions for both male and female, but it was not until 1820 that they were applied to slaves and free colored. But inasmuch as the age grouping was not the same for each of the three classes, no total for the country was obtainable by age groups. In 1830 and 1840 the number of age classes was increased, but they remained different for the different classes. In 1850, when an individual enumeration first took place, the question of the age grouping became a matter of tabulation rather than of the schedule.

Other items of importance which had a beginning before the reform of the schedule in 1850 were occupations, 1820 and 1840 but not 1830; physical defects, 1830 and 1840; and illiteracy, 1840. Distinctions of race and servitude were regarded as fundamental, and each class, free whites, other free persons, and slaves, was divided by sex and further divided by age. But such other items as appeared on the schedule gave total numbers only without distinction of race, servitude, or age.

The schedule of 1850 takes cognizance for the first time of marital condition, but only in so far as it attempted to record the persons married within the year and thus form a substitute for the registration of marriages. This form of the question persisted through the schedules of 1860 and 1870 and it was not until 1880 that the marital condition of each person enumerated was recorded.

It has seemed worth while to note the development of interest in the facts of population, by showing their successive appearance in the census schedules, and their frequent passage from crude to more satisfactory forms which admit of proper detail and relationships. Equally important for the development of population statistics—though it can not detain us so long—is the development of tabulation methods, since upon these rests the amount of tabular detail which can be conveniently presented. Three periods may be distinguished:

1790 to 1840—Summation of schedules.

1850 to 1880—Tallying.

1890 to 1910—Mechanical tabulation.

The first method has very narrow limits; the second and third have theoretically none, except those imposed by cost, which, however, cuts a larger figure for a given result in the second than in the

third method. Hence there has been a progressive development in the presentation of returns.

Having noted some salient points in the development of population statistics in the United States, it remains to consider their scope, which may be most conveniently done with reference to the enumeration of 1910, the results of which are still in process of elaboration.

The magnitude of a census undertaking may be said to depend upon three things: (1) the number of questions asked; (2) the geographical detail of presentation; and (3) the number of cross-relationships established between different items of the enumeration. Because in the census of the United States each of these elements is a considerable one, it can readily be understood that their combination renders the census a very formidable undertaking.

Because of its composite population, in which members of different races and of many and distinct nationalities live side by side, the schedule of the population inquiry contains of necessity more questions than are common in most European countries. It consists of no less than 28 columns of questions applicable either to the entire population or to large sections, as follows:

The entire population: Sex, race, age, marital condition, place of birth, place of birth of father, place of birth of mother, occupation and industry, status as employer or employee, and if the latter, whether actually at work, and the number of months unemployed during the year, whether deaf and dumb or blind.

Population 10 years of age: Ability to read and write; ability to speak English.

Population 5 to 21 years of age: School attendance.

Male population 50 years of age: Whether survivor of Union or Confederate army or navy.

Married men and women: Duration of present marriage.

Married, widowed, or divorced women: Number of children born and number now living.

Foreign-born population: Number of years in United States, and mother tongue.

Foreign-born males 21 years of age and over: Whether naturalized or alien.

Heads of families: Ownership of home.

A glance at this list of subjects shows that the census of the United States would be a considerable undertaking if it were confined to the presentation, for the country as a whole and for the larger units, of the mere facts enumerated. It is, however, to be remembered that the census is here, as elsewhere, an organ of local description, and therefore the extent of geographical detail becomes a determining factor in the magnitude of the census undertaking. Besides furnishing the broad facts needed by the student of population gen-

erally, it is necessary for the census to present the special facts concerning each locality needed by the student of local conditions.

It is characteristic of the census of 1910 that it makes a somewhat sharp distinction between the geographical analysis of local description of the population and its subject analysis. It is particularly in the former that the wealth of geographical detail imposed by the size of the country and its many subdivisions is a factor of the greatest importance. The geographical units recognized in census work are the nation as a whole, certain large geographical divisions, the States, the counties, and the cities and towns.

Two volumes of the final report will be devoted to what may, for convenience, be called the geographical analysis or the local description of the population. For this local description the primary units may be said to be the counties, of which there are 2,955, and the cities of 25,000 inhabitants and upward, of which there are 229, or a total of 3,184 primary units. The descriptive material which will be published by the census containing the population of 1910 consists, for the counties, of 135 separate items, divided as follows: General population, increase, urban and rural (10); color and nativity (14); country of birth (37); sex (6); males of voting age (15); illiteracy (23); school age and attendance (27); dwellings and families (2).

In addition to this information derived from the census of 1910, there is given, for purposes of comparison, for each of these units a considerable number of items drawn from the census of 1900.

In addition to the data for these primary units, information is given further with regard to certain subsidiary units, in two classes: First, the cities of 10,000 to 25,000 inhabitants; and, second, cities of 2,500 to 10,000 inhabitants, together with the wards of cities having 50,000 inhabitants or over. The whole number of cities is 2,176, and the number of wards is approximately 1,400. The presentation of population data for cities of 10,000 to 25,000 inhabitants is about half as extensive as for the primary units. For the smaller cities and for wards it is about one-fourth as extensive as for the primary units, there being 33 separate items given for each unit in this smaller group.

In comparison with the work of previous censuses, the characteristics of the census of 1910 in its local descriptions are, first, the wealth of detail which is given, and second, the convenience of arrangement. The latter feature, which consists of giving all the items for a given locality in a single column, has not only served the purpose of bringing together items of information hitherto scattered, but has also in some degree made it possible to give that greater wealth of detail which is one of the characteristics of the census of 1910. To the descriptive facts given concerning the geographical divisions of each State will be added a somewhat more detailed statement with regard to the State

itself and its larger cities. In this aspect of the census, the unit of treatment is the individual State. The aim pursued has been to present in convenient juxtaposition all of the facts secured by the census regarding the population of a given State, its principal cities, its smaller towns, in fact all separate communities having a population of 2,500 or more, and its minor civil divisions, giving the number for all such divisions and analyzing in considerable detail the facts of the population for the larger civil units, the counties. In the main tables the concentration on a single page or at the most on two opposite pages, of all the facts concerning a given locality is the characteristic of its treatment. For the country as a whole this geographical analysis or local description of the population will form two volumes of the census report and occupy upward of 2,000 closely printed pages.

We turn now to the second aspect of the census work, the presentation of its results by subjects. This subject treatment also takes cognizance of the larger geographic divisions, such as groups of States, or in census parlance, divisions, the States themselves, and cities of 100,000 inhabitants. It also takes cognizance to a limited extent of medium-sized cities having a population of 25,000 to 100,000 inhabitants.

But in this subject treatment any geographical detail is incidental, not fundamental. The main purpose of this treatment is to display the characteristics of the population on broad general lines. In order, however, that the significance of such broad general characteristics can be fully understood it is essential to indicate how they occur in different sections of the population, the States as representing different geographical areas, and cities as representing a distinct social and economic group. In brief, the census treats the same material in two distinct ways: A local analysis which studies localities with a view to the distribution of population characteristics, and a subject analysis which studies characteristics in the light of their distribution among localities.

In this subject analysis of the population certain primary facts are regarded as being of dominant importance, and these are the distinction of race, nativity, and parentage. The composite character of the population, already referred to, makes it necessary to give to these several classes of the population great weight. These classes are among the population at large, the whites as distinguished from the negroes, among the whites the native born as distinguished from the foreign born, and among the native-born white those of native as distinguished from those of foreign or mixed parentage. Somewhat similar classes are not, it is true, wholly absent from the population of any modern State, but they have probably nowhere else the same numerical importance as in the United States.

The census analysis is twofold: First, a further analysis of the primary classes of the population themselves, and second, an analysis of other subjects with reference to these primary classes.

The analysis of the primary elements themselves consists in making up the large groups with component elements. Thus the native population, both white and negro, is divided with respect to State of birth and present residence, while the foreign stock is distributed according to the country of birth of its members and of their parents. Moreover, for the foreign born, information is given in detail with respect to the number of years in the United States, with respect to mother tongue, and, so far as applicable, with respect to citizenship.

For all of the facts enumerated by the census which are applicable not to a single class of the population but to all, the details are presented for each class. This includes the treatment of such subjects as sex, age, marital condition, illiteracy, school attendance, and occupation. With respect to each of these various matters not only must all the details which the subject itself suggests be presented, but the details must be given for each of the several primary classes of the population.

Of this subject treatment no complete illustration in printed form can be given. The only bulletin yet ready deals entirely with the local population and gives no reference to the classes of which it is composed. This bulletin on the number and distribution of inhabitants can serve only as a type of the treatment of the geographic units compared.

The line of cleavage established between local and subject treatment lends itself to an important change in the publication of the census results. Hitherto there has been a single volume called an "Abstract," and a series of large volumes containing the comprehensive report. The comprehensive report will appear as heretofore, but the scope of the Abstract will be modified. It will contain all the general matter relating to the United States as a whole, the several States and principal cities as at former censuses, but will be issued with a supplement for each State containing all the information published for that particular State. In other words, the Abstract will be issued in 52 different editions.

The Abstract will therefore constitute at the same time a book of general and local reference. Apart from the perishable bulletins, local information, the number of males in a given county, the number of illiterates in a small town, and similar items interesting chiefly to the student of local conditions, has heretofore been available only in the larger census volumes. The Abstract with the State supplement will furnish this information in compact form, with convenient material for comparisons. The student of conditions in a small town is not likely to extend his comparison beyond those of his own State; the student of

conditions in a given county finds the comparisons he needs in neighboring counties. Neither, as a rule, is interested in the towns and counties of other States. On the other hand, the student of larger units, the State or its cities, wants more extensive comparative material, and this he will find in the general part of the Abstract.

This somewhat extensive program of publication has been made possible by so preparing the text and tables of the census bulletins that they can be reprinted bodily without rewriting as parts of the Abstract and of the final reports. They not only contain advance information, but are in a strict sense advance sheets of the final publications. Moreover, it is believed that through the contemplated form of publication the main results of the census will be more widely and more effectively disseminated than ever before.

In conclusion, it may be said that several elements combine to render the decennial enumeration of the population of the United States by the Federal Government a work of greater magnitude than is commonly the case for similar enumerations in foreign countries. In the first place, the size of the population is in itself an element of importance. Secondly, it may be noted that all of the work for the entire country is done by the Federal Government, and there is no local cooperation in taking the census, as, for instance, in the case of the German Empire. The responsibility for the publication of local detail rests, therefore, wholly with the central office and is not distributed as in other countries. Thirdly, the composite composition of the population renders necessary a larger number of questions than elsewhere and involves a more detailed presentation of results.

From the beginning of its history the United States has endeavored, through its census, to furnish the demographic information essential to a description and analysis of its population. It has worked at times, as we have shown, by ineffective methods, but the characteristic of the whole development has been an earnest desire to increase the wealth of available information. Mechanical improvement, and perhaps a keener appreciation of the social problems involved, have aided in expanding the presentation of the census results. Those who have had to do with the census of 1910 indulge the hope that when the work is entirely completed they will have made a more substantial contribution to our knowledge of the population than any of their predecessors.

THE TRAINING OF DEMOGRAPHERS IN GERMANY.

Dr. Eugen Würzburger, Director Royal Statistical Office of Saxony, Dresden.

I agree with the honorable president of this section in calling "demographers" the persons who apply the numerical or statistical method to the study of human life in the mass, and to its great vital

processes, birth and death, marriage, divorce, and migration. German conditions form the basis of my topic; probably, however, similar conditions are to be met with in other countries. Persons with actual experience in studies of demography are needed in Germany (1) for positions as chiefs and for some positions as officers of the statistical departments of the Empire, the States, and the municipalities; (2) for several positions in certain other imperial and State departments, which have to do with insurance, e. g., the imperial insurance department; (3) for insurance companies.

On the other hand, the health departments care much less for demography than in the United States and other countries, leaving that work to the statistical offices.

Therefore, the question to be considered here is that of supplying fit men for the statistical offices, since the positions named above, under (2) and (3), are so few that no special provisions for training men to fill them can be introduced.

The occupation of a statistical officer is one of the few in the German Empire for which no definite training is prescribed and for which persons of different scientific equipment are wont to be chosen. Among the statistical officers of the several States, the majority are persons whose education has been directed mainly toward work in law and political science. Among the statistical officers of the municipalities, the majority are persons who have had a practical statistical training in other State offices in addition to their special scientific equipment. Recently the number of persons in the universities who give their attention to special training in statistics is increasing. This is connected with the great increase in the number of statistical offices and officers of recent years. An opportunity for statistical and demographic training is afforded at a number of universities and other advanced schools by statistical lectures and seminars given regularly or at recurrent intervals. A questionnaire regarding the kind and the object of such an education in higher institutions as well as regarding the desires of this sort which are felt is now being organized by the German Statistical Society. It extends also to the higher institutions using German as a vehicle of instruction but lying outside the German Empire, in Austria and Switzerland.

A compilation of the statistical lectures and seminars held not only in Germany but over the whole globe is to be found in Dr. Platzer's Jahrbuch der Statistik (Strassburg, 1909), a second edition of which will soon appear.

On the whole, about 60 different statistical courses of lectures and seminars are given every semester in the German language in the universities and other advanced schools of Germany, Austria, and

Switzerland, most of them meeting two or three hours each week. Among them we may distinguish:

(*a*) Those which are intended to give an introduction into the technical methods of statistical inquiry and statistical tabulation. A part of these courses consist of practical exercises in statistical offices. This system was followed by Engel and Boeckh, who taught statistics besides being directors of statistical offices, as does Georg von Mayr in his position as professor of statistics in Munich.

(*b*) Theoretical introductions to the whole field of statistics and demography, embracing both the methods of inquiry and tabulation and the use of statistical tables. In Austria the students of law are obliged to take such courses.

(*c*) Those upon mathematical statistics, having in view first of all the application of mathematics to statistical results as required by the science of insurance. Lectures of this kind are given at only a few universities, especially in Gottingen by Lexis and Bernstein.

(*d*) Lectures on demography and on its results are also given sometimes, for instance last year at the universities of Berlin, Bonn, and Freiburg. More frequent than these are the lectures on definite fields of statistical investigation, viz, moral statistics, medical statistics, economic statistics and social statistics; of course a part of these courses must be devoted to demography.

Whether statistical and demographic instruction of these kinds is occasionally given depends on the inclination and interest of the professors in the different fields. Nevertheless demographic lectures at the universities are becoming more and more the rule, and the number of young men practically and theoretically equipped who want to enter statistical offices seems to have increased of recent years. If this view is correct, it may be that in the near future statistical officers will be chosen regularly from among the persons with special scientific equipment; and it is to be hoped for the same reason that the public service will give its attention to a systematic training of statisticians and demographers, as has been done for a long time in training men for other professions of a scientific character.

I can not end my short paper without thanking the committee of this congress for having included in the program this important question, and without also expressing the hope that in future our colleagues, instead of renewing the unfruitful dispute whether statistics is a science or a method, may consider the solution of the far more profitable question what the statistician must know and should be able to accomplish.

HOW ARE TRAINED STATISTICIANS SECURED IN FRANCE?

M. Lucien March, Director of the General Statistics of France, Paris.

When I was asked to give an account of the training of statisticians in France, I felt that it would be difficult for me to give an interesting report, because in France most persons in charge of collecting statistics have had no special training in statistical work.

In France few persons are exclusively occupied in preparing statistics. Most of them are employed in public offices, the principal function of which is the execution of the law. It is commonly admitted that the administrative part of their work is the most important and that any learned man is capable of doing the statistical part of it.

Among the inconveniences of this state of affairs the most striking is the fact that statistical data are not as abundant as they could be and in the interest of science ought to be. Often the most significant are neglected, the statistical work being limited to such tabulations as may be needed for administrative purposes.

On the other hand, there are in France very few courses intended for the training of students in statistics. At the Faculté de Droit de Paris M. Fernand Faure gives regular lectures in statistics (28 lectures a year); M. André Liesse gives also some lectures at the École des Sciences Politiques. In these courses students in political or economic science are taught to make use of rather than to compile statistics. Since the death of the late M. Levasseur, the lamented leader of French statisticians, the lectures which he used to deliver at the Collège de France and at the Conservatoire des Arts et Metiers have been discontinued.

From the special viewpoint of demography, the law on public health provides that there should be a public health office in each town having a population of more than 10,000. No statistical knowledge is required of the officers; the directors are chosen from among the physicians.

Even the title of statistician as connected with a public function is to be found only in the offices of the general statistics of France. There statisticians are appointed after a public competition. They have not been initiated into the statistical method, since no lessons in this science are to be found, but the kind of knowledge required may be indicated by the fact that a part of the examination is on the calculus of probabilities and its application to statistics.

In brief, statistics seems up to the present time not to have been regarded in official circles of France as a particular body of knowledge the study of which is necessary for the observation and sys-

tematic judgment of numerical facts. No doubt a good general education is necessary, but it is not sufficient. Still the best training in statistical work is perhaps a practical one with some theoretical studies on methods.

HOW MAY THE DEMAND FOR DEMOGRAPHERS AND THE SUPPLY OF THEM IN THE UNITED STATES BE INCREASED?

Prof. WALTER F. WILLCOX, President of the American Statistical Association, Cornell University, Ithaca, N. Y.

A distinguished German demographer, after careful examination of the evidence, has concluded that [1] "Massachusetts was the first State in the Christian world which recorded births, deaths, and marriages by Government officers; Massachusetts was the first State in the world which recorded the dates of the actual facts of births, deaths, and marriages rather than the subsequent ecclesiastical ceremonies of baptisms, burials, and weddings; and Massachusetts was the first State in the world which imposed on the citizen the duty of giving notice to the Government of all births, deaths, and marriages occurring in his family." And another, even better known, has stated: [2] "It was no European State, but the United States of America that made a beginning of census taking in the large and true sense of that word." This may seem inconsistent with the common statement that Swedish censuses began in 1749, while it is well known that the American series did not begin until 1790. But Swedish censuses are derived from continuous population registers and not from separate enumerations. In a third branch of demography also the United States may claim to have done pioneer work. The registers of immigration into the United States began in 1819, probably earlier than the immigration or emigration records of any other country.

Registers of births, marriages, deaths, and immigration, and censuses of population constitute the primary demographic data, without which the science is an impossibility, but from which it is a natural development. These data seem to have been systematically recorded in the United States or some of its divisions earlier than elsewhere, and yet demography in the United States is less developed to-day than in any of the leading countries of Europe, possibly less than in Australia or New Zealand. There is an apparent inconsistency between its early and promising start and its retarded and sluggish development. To explain the reasons in detail would carry us too far afield and is unnecessary as a basis for my argument. Yet certain differences between European and American conditions may be noted.

(*a*) It is very difficult to establish complete and trustworthy registration records in thinly settled districts. This difficulty is probably

less in older countries, where the agricultural population is relatively immobile, family records are maintained, and social traditions persistent and influential. But for decades in the United States the farming population has been restless and migratory, pushing toward the frontier and cutting itself off from the centers of more highly organized social life. Births without medical attendance were common, if not usual. Deaths resulted in burials near the house in family cemeteries. Under such conditions the systematic registration of births and deaths in public offices is almost impossible. The lack of schools made inability to read and write common and hindered the preservation even of family records. This appears clearly from the difficulty in tracing the ancestry of the most distinguished American born in the nineteenth century, Abraham Lincoln. His biographer tells us:

> There are hundreds of families in the West bearing historic names and probably descended from well-known houses in the older States or in England, which by passing through one or two generations of ancestors who could not read or write have lost their continuity with the past as effectually as if a deluge had intervened.[3]

The traditions of independence, if not of lawlessness, arising in the United States under these circumstances have been and are serious obstacles to the development of trustworthy vital statistics. Similar difficulties have prevented or retarded the development of trustworthy registration statistics of births, marriages, and deaths in Canada and South Africa and, if the good registration statistics of Australia seem to tell against my contention, it may be noticed that in Australia the proportion of urban population has long been very much greater than in the United States.

(*b*) A natural outgrowth of this temper was the tendency to deny the right of the Federal or National Government to touch the subject of vital statistics at all. Francis A. Walker, probably the most distinguished of American statisticians, stated this position in the following words:

> That large party which advocates a strict and jealous construction of the Constitution would certainly oppose any independent legislation by the National Congress for providing a registration of births, marriages, and deaths.

No attempt has ever been made to pass such legislation. Throughout the last half of the nineteenth century attempts to find a substitute for the registration of deaths were made by reporting them in connection with successive censuses. Each enumerator was instructed to ask of each family whether a death had occurred there during the preceding year and, in that case, to obtain detailed information regarding it.

In 1880 and 1890 these inquiries were directed and their results interpreted by our distinguished and honored vice president, Dr.

J. S. Billings. But even his ability could make little of material so hopeless, and a half century of work resulted in little more than the erection of a "No thoroughfare" sign and the diversion of efforts to more remunerative channels. Such channels have been found in the development of continuous cooperation between the Federal Government, acting through the permanent Census Bureau established ten years ago, and the State and municipal governments, whereby the States and cities require and obtain certain returns, of which the Federal Government secures copies and then tabulates, interprets, and publishes them. The Federal Government also urges, but has no power or desire to do more than urge, the enactment of uniform registration laws after a suggested model. Such laws regarding the registration of deaths are now in force in States and cities embracing five-eighths of the population of the country. This proportion has risen in seven years from 40 per cent in 1905 to 63 per cent in 1911, and one may fairly claim that American mortality statistics have improved more in the last 10 years than they did in the preceding 50. A similar policy regarding birth statistics may be introduced in the discretion of the Director of the Census. Marriage and divorce statistics obtained from State or county records have already been collected twice at intervals of twenty years by the Federal Government, and one of the suggestions to be laid before this Congress is that such statistics should be gathered every year.

(*c*) The data for a study of American mortality statistics prior to 1900 were scattered through a series of annual reports of widely different value. In some cities or States these documents were useless or misleading. I recall the monthly bulletins of one of our large States which were regularly so full of errors in addition and division as to make them, when these elementary errors had been corrected, look like proof sheets of very bad printer's work. Other similar bulletins were of excellent quality. But here as elsewhere the unwillingness, in case of a vacancy, to appoint a man from another city or State and the lack of standards in vital statistics made even good work temporary and its quality likely to change with the man. The improvement of Michigan's annual registration reports after the secretary of this section became their editor and their subsequent deterioration are but familiar illustrations of what has been repeated many times in American experience. Under such circumstances it seemed hardly worth while to collect and to criticize our reports on vital statistics, and very few libraries gathered them, very few students analyzed, compared, or interpreted them.

(*d*) The number of public officials who have any training or any interest in vital statistics has been very small. In the annals of our Government statistics there have been no demographers whose

length of tenure and whose quality of service deserve comparison with those of Farr and Newsholme in England, the Bertillons in France, Becker, Boeckh, and von Mayr in Germany, Inama-Sternegg and Juraschek in Austria, Keleti and Körösi in Hungary, Bodio in Italy, Kiaer in Norway, Quetelet in Belgium, Guillaume in Switzerland, and many, many others. On comparing the length of service of the six persons who were at the head of the United States Census Office between 1850 and 1900 with that of the seven persons who were most closely identified with census work in England, Germany, Prussia, Austria, Hungary, Russia, and Italy, I find that the Americans served, on the average, 4½ years and the Europeans, on the average, 24 years. In Europe official statistical work is a vocation; in the United States it has been an avocation.

Some historians have argued that the central and the dominant fact in the annals of the United States is the existence and influence of the frontier. This line, or rather this belt of land, might be approximately defined as that part of the country in which the population doubles in ten years. As so defined it has gradually been pushed westward by the advancing tide of settlement and disappeared about the close of the last century. The recent development of a new social spirit and atmosphere in the United States, illustrations of which are found in the conservation movement, the public-health movement, the efforts to diminish infantile mortality and child labor and to multiply playgrounds and opportunities for recreation, the various attempts to curb the Nation's excessive individualism, and to imbue individuals and corporations with a deeper realization of their responsibilities to the community, all this is due no doubt in large degree to the passing of the frontier. If so, we may confidently anticipate that the rapid development of demography in the United States will continue and that within the next generation a national system of vital statistics will grow from the voluntary cooperation of cities, States, and Nation, and furnish trustworthy and adequate material. This movement is now advancing so rapidly that it seems likely to continue to that end.

Let us suppose that such a system develops. What use will be made of it? Statistics of births, marriages, deaths, divorces, and migration are merely data, not demography. To build them up into a science there is a need of scientists, demographers, to work patiently and intelligently at their interpretation.

Probably no type of scientific men is so poorly represented in the United States to-day as official demographers. One or two illustrations may make this clear. Several years ago the position of Chief Statistican for Vital Statistics in the Census Bureau, which is in some respects the most important demographic position in the

United States, fell vacant and I chanced to be consulted about the man to fill it. Of the three names which I then heard mentioned only one had been trained in demography proper, and I found it hard to name others whose natural aptitude had been revealed and developed by their experience. As State after State within the past ten years has passed registration laws and put them in practice, in how many cases has the appointing officer wished and been able to find a trained demographer to take charge? Has it not been the rule to appoint the most available man in sight and leave him to train himself by his own experience? In order to be available a man is usually required to be a resident of the State or city involved, a restriction upon the choice of the appointing officer which is likely to work unfortunately. These difficulties, I believe, are temporary and transitional. But before they can be removed a certain number of demographers must be available. How shall they be secured? Obviously, they must be trained; but where and how?

Probably in no branch of American education is the curriculum so overloaded as in the medical schools. No room can be made in them for the training of demographers. Perhaps after one or more years of graduate study in medicine, including courses in medical statistics and demography, a special degree or diploma might be offered, as it now is in England. Some tentative movements in this direction have already occurred. But our medical schools aim to train men for private practice in the cure of diseases. Training in public medicine or the prevention of disease is alien to their purpose and spirit. The average physician no more seeks to prevent disease in the community at large as distinguished from his clients than the average lawyer seeks to prevent litigation in the community at large. This method of securing demographers by training them in our medical schools seems unlikely to succeed.

Some American universities have developed courses in statistics and they perhaps are doing more than any other educational agency toward training the needed men. But statistics is broader than demography, and university courses in statistics seldom lay much stress upon medical and sanitary statistics. Such courses are given commonly by teachers of economics or sociology, who naturally enough make the subject tributary to their own main interests. There is another difficulty. University courses are prone to lay undue stress upon the methods of interpretation in the quest of generalizations and too little upon planning a fruitful investigation or testing the trustworthiness of the data. I can not but feel that recent tendencies to emphasize the measurement of correlations between various social phenomena by refined methods of mathematical analysis, however valuable in their place, may entail a loss of perspective.

It is an impression which has gradually developed during my studies of American statistics that the great majority, say four-fifths, if not nine-tenths, of the errors in statistical arguments have their root in the data as tabulated rather than in the use of unsound or misleading methods of interpretation. Before testing and measuring the correlation between two series of phenomena it is of the first importance to be sure that each phenomenon has been carefully measured and to know the probable margin of error in the results. Statistical courses that would help one in demographic work have increased little, if at all, in our universities of recent years. Certainly the increase of supply has been in no wise equal to that of demand. Perhaps our bureaus of health and registration, Federal, State, and municipal, have discouraged such courses by undue insistence upon the medical training of registrars. Be the cause what it may, the development of the American public-health movement is hampered by lack of trained demographers.

The great majority of American demographers had a medical training and only that as a direct preparation for their work at the time when they began it, and they have acquired their knowledge of statistics by their own experience since appointment. If such officers were in all cases wisely selected at the start and served many years before retirement, this method might give good results. But under prevailing conditions of appointment and tenure it is unsatisfactory.

Under present American conditions the best opportunity for training demographers lies, I believe, not with the medical schools, not with the universities, not with special schools of sanitary science should they arise, but with the offices themselves. Possibly in this as in other phases of the problem the time is now ripe for cooperation or assistance from the Federal Government. Might not the Division of Vital Statistics of the Census Bureau find it a legitimate part of its duty to train registrars or would-be registrars for subsequent service in State or municipal offices just as many State geologists have been trained in the United States Geological Survey and many State agriculturists in the United States Department of Agriculture? I make this suggestion without consulting my friends, the Director of the Census and the chief statistician for vital statistics. They might raise objections to it that would be deemed fatal. But much as the Census Bureau has done for demography during the ten years since it became permanent, it has done little to increase the number of trained demographers available for promotion in its own staff or for appointment elsewhere. It may have been dealing with problems more urgent and insistent, but I think there are none of greater ultimate importance. If the time comes when this aspect of Federal work is emphasized, it will hardly be until some enthusiastic teacher of demography turns the office into a laboratory. Something of this

sort was done for twenty years in another field by Carroll D. Wright, who did much to develop a group of American labor statisticians. Even more was done in England by Farr and in Germany by Ernst Engel.

Perhaps a greater opportunity for developing work of this sort is open to the registrars of certain large States or cities. They are in direct touch with the facts as the Federal Census Bureau can not be; they are responsible so to interpret the figures as to make them throw light upon local demographic problems and furnish guidance to local public-health work. If a Newsholme, a Bertillon, a Boeckh, or a Körösi should take hold of the vital statistics of any one of our greater States or cities and receive adequate encouragement and support through a long series of years, he might do more to prove the practical value of demography and to raise up imitators in the country than can be done in any Federal bureau. For this method of training demographers to succeed, there is need not only of the right man, but also of the conditions enabling him to work to advantage for many years. At present both seem to be lacking.

For the rapid development of demography in the United States there is need of sound individual work both critical and constructive. We have accumulated so much raw material that for the first time the main outlines of American demography could be traced. But the work of systematic interpretation is in arrears. Here the individual student and writer can do useful work.

Probably his best service would lie in attempting to reduce to order and system and to present in attractive form the main results of demography with especial reference to American conditions and problems but with an eye ever to the main results secured in countries where the science is more advanced.

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[1] R. R. Kuczynski, The Registration Laws in the Colonies of Massachusetts Bay and New Plymouth, American Statistical Association Publications, 7:73.

[2] Georg von Mayr, Statistik und Gesellschaftslehre, vol. 1, p. 166.

[3] J. G. Nicolay and J. Hay, Abraham Lincoln: A History, vol. 1, p. 1.

THE DEVELOPMENT OF MECHANICAL METHODS OF STATISTICAL TABULATION IN THE UNITED STATES WITH ESPECIAL REFERENCE TO POPULATION AND MORTALITY DATA.

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The people of the United States, having ordained in their Federal Constitution that representation in the popular branch of the national legislature and all levies of direct taxes should be apportioned among the States according to the numbers of their inhabitants, exclusive of "Indians not taxed," and counting but three-fifths of persons held

in permanent servitude,[1] found it expedient to provide in the same organic law and in the same section for decennial enumerations. Thus upon the firm foundation of the fundamental law were laid the first courses of that great structure which at the close of each of the last four decades, that is, in 1880 under Walker, in 1890 under Porter, in 1900 under Merriam and in 1910 under Durand, was exemplified in a census that was nothing less than a broad and full inventory of substantially all the elements of national strength. Some measure of the expansion of the demands for information to which response has been attempted is afforded by the statements in the invaluable "History and Growth of the United States Census" by the late Col. Carroll D. Wright and Mr. William C. Hunt,[2] which shows that while only one schedule of inquiry sufficed in 1790 and 1800 and even in 1830, six were used in 1850 and 1860, five in 1870, 215 in 1880 and 233 in 1890, and that the number of inquiries increased from four in 1790 and 1800 to 13,010 in 1880 and 13,161 in 1890. Although the inquiries of 1900 and 1910 were somewhat more restricted than those of 1880 and 1890 the field covered by these more recent censuses was not much diminished, and it is not likely that in any census to come the American people will be satisfied with materially less complete and exhaustive information.

During the period of this expansion in the demands for descriptive data, to which each successive census has been obliged to respond, the number of individuals, and the volume of industrial and other transactions and events necessary to be covered, have vastly increased, as is sufficiently indicated by the growth in population from 3,929,214 in 1790 to 92,174,515 in 1910, and in wealth from $7,135,780,000 in 1850 to $107,104,211,917 in 1904.

Whoever contemplates an inquiry which has for its purpose an accurate statistical description of the people of a nation with over ninety millions of inhabitants, including those details suggested by the phrase "population and mortality data," embraced in the title of this paper, is speedily brought face to face with the fact that his effort must be subject to two inevitable limitations, the first of which is measured by the ability to secure the necessary facts concerning the individuals composing so vast a group, and the second by the capacity to arrange, classify, consolidate and compare the facts that are so obtainable. The first is a problem of enumeration or of accurate and accessible records, complicated by the fallibility of those to be enumerated and of the agents of enumeration or of those who make up the records and compile data from them; the second, a problem of executive efficiency complicated by the power of the legislature to grant or to withhold supplies and by the extent and nature of the mechanical aids which can be utilized.

Recognizing fully the inexorable character, at least in the present state of general culture, of that limitation which is fixed by the difficulty of greatly extending or strengthening the basic data that must be utilized, it is not too much to assert that after all the most practical and effective present limitation is that which restricts the utilization of those sufficiently reliable data which are accessible and are regularly obtained. Although the introduction of the mechanical devices so strongly relied upon in the Eleventh, Twelfth and Thirteenth censuses has permitted gigantic strides in the desired direction, no census has ever even approximately exhausted the possibilities lying within the data it has collected and each has left untouched or uncompleted illuminating tabulations the data for which were in its possession. That the margin of neglected utility in the data collected has not been vastly more extensive in each of the last three censuses is wholly due to the devoted ingenuity of a single American citizen, Dr. Herman Hollerith, the inventor of the electrical tabulating system known throughout the world by his name, while, as to the last two censuses, it may fairly be said that the wasteful margin might further have been reduced by means of a more complete utilization of the machines and processes comprising this system.

The urgent need for a more efficient system of tabulation to supersede transcribing and tallying by hand became apparent to Gen. Francis A. Walker, who had charge of the inquiries of 1870 and 1880, almost at the beginning of his census experience, and with his customary energy and foresight he sought promptly to encourage the inventive ability of those who had the requisite acquaintance with the conditions of the problems to be solved. Aside from the impetus given to an idea of potential fecundity, the net result of this encouragement was the invention, by Col. Charles W. Seaton, chief clerk of the Census under Gen. Walker, and the latter's successor as superintendent of the Tenth Census, of the so-called Seaton tabulating machine. This device was extensively used in the Tenth Census, it effected a very material gain in efficiency over the methods which it superseded, and it brought to its discoverer the by no means adequate reward of a Congressional grant of the sum of $25,000, but it is scarcely accurate to call it a "tabulating machine" for it was merely a contrivance of parallel rollers by which blanks were unwound from a roll so as to bring six columns—one from each of six different blanks or tables—into close proximity, thus aiding the clerk in compiling and transcribing. Although it served well, in the absence of a more truly mechanical means of tabulation and, as the initial step in the process of a splendid evolution, deserves to be recorded, it would not have met the problems of the present and it became obsolete as soon as a better device entered the field.[3]

Dr. Herman Hollerith, the story of whose labors for the last 30 years is the history of the development and application of the electrical tabulating system and machinery, was a special agent of the Tenth Census (1880) and in that capacity won early recognition as an exceptionally able and accomplished statistician. That his attention was especially drawn to the need of mechanical aids to the census tabulations he attributes to Dr. John Shaw Billings, now director of the New York Public Library, Astor-Tilden-Lennox Foundations, but then in charge of the census inquiries concerning vital statistics, who particularly apprehended the difficulty, with the then existing means, of those classifications of population which depend upon combinations of age, sex, race and general nativity. Assuming the task thus suggested, after leaving the service of the Federal government, Dr. Hollerith developed a system of recording the descriptive data for each individual or unit of inquiry by punching holes in strips of paper or cards which could be adapted to control electrical mechanisms in the form of counting or adding devices, either singly or in desired combinations. The earliest practical utilization of this method and of the machinery devised for its application was in the tabulation of mortality statistics of the city of Baltimore, and they were also given early use by the Bureau of Vital Statistics of New Jersey and by the Board of Health of New York City.

The first patents on account of the Hollerith system were issued on January 8, 1889, and the second claim of patent 395,782 describes the basic and fundamental idea that constitutes the motif of all further inventions and applications of the system, whether by the original discoverer or by those who have attempted, since the expiration of the earliest patents left the generic principle at least partially open to the common endeavor, to build upon the foundation which he erected. This claim is as follows:

> The herein described method of compiling statistics which consists in recording separate statistical items pertaining to the individual by holes or combinations of holes punched in sheets of electrically nonconducting material, and bearing a specific relation to each other and to a standard, and then counting or tallying such statistical items separately or in combination by means of mechanical counters operated by electro-magnets, the circuits through which are controlled by the perforated sheets, substantially as and for the purpose set forth.

The essential conception defined in the foregoing is that of a principle or method of tabulation rather than that of a particular machine for the utilization of any principle or method. In fact it is necessary, in order to arrive at any adequate comprehension of the value of this discovery, to bear always in mind that it begins with the recording of the facts in a manner which permits the utilization of the records thus obtained, that is to say of the punched cards, as

means for the direct and immediate control of any description of counting or computing machinery. The electrical current is doubtless the best medium for effecting this control but it is by no means the sole available medium and although, as at first applied, the mechanisms controlled were counting devices and the cards were fed into and taken from the machines by hand, the application of the Hollerith method was speedily developed to include the operation of batteries of from four to eight adding machines controlled by a single card and of sorting machines for separating different classes of facts (i. e., cards recording such facts) and the utilization of automatic feeding devices capable of working at the highest speeds. An especially interesting development, applied to a limited extent in the population inquiries of the Twelfth Census and more fully in the Philippine census, consists in the adaptation of this method to the discovery and correction of those errors of enumeration or transcription which produce obvious incongruities, such as recording children as heads of families and assigning to a particular farm area a yield known to be excessive and impossible. By the use of the automatic feed and a suitable mechanical arrangement all such errors can be detected and proper corrections can be made at a minimum expense. Another device, patented by Dr. Hollerith, enables the results of each tabulation to be printed on sheets of convenient dimensions directly from the tabulating mechanism. If it should become desirable, the further development of the applications of this principle is certain. The same method by which groups of counting machines and adding machines are now operated so that each particular machine takes from each card those facts and only those facts which it is adjusted to assimilate, although all are simultaneously subjected to the control of the single card, can readily be adapted to the operation of any other sort of computing or compiling mechanisms.

The opportunity to apply the Hollerith system to the census problems for which it was especially devised, those of the population and vital statistics tabulations, was first open at the commencement of the organization for the Eleventh Census (1890). Hon. Robert P. Porter, the chief officer of that census, qualified in that capacity by taking the oath of office on April 20, 1889, and on July 30, barely three months later, designated a commission consisting of Dr. John Shaw Billings, Mr. Henry Gannett and Mr. William C. Hunt, three of the ablest and most experienced statisticians in the United States, to make a practical test of all systems of tabulation which should be offered for use in connection with that census. Mr. Hunt, subsequently determining to offer a nonmechanical system of his own and retiring from the commission, was succeeded by Mr. L. M. E. Cooke, an expert in the mechanical questions

involved in the test. The report of this commission, submitted on November 30, 1889, shows that three methods—the electrical method of Dr. Hollerith, the "chip" system of Mr. Charles F. Pidgin, and the slip system of Mr. Hunt—were offered in competition and were thoroughly tested by tabulating according to each method the population data taken in the 1880 census for four enumeration districts, containing 10,491 inhabitants, in the city of St. Louis. The results of this competitive test were reported as follows:

Method.	Time required—					
	To transcribe.		To tabulate.		Total.	
	H.	*m.*	*H.*	*m.*	*H.*	*m.*
Hollerith's	72	27	5	28	77	55
Pidgin's	110	56	44	41	155	37
Hunt's	144	25	55	22	199	47

If these comparisons are stated as percentages and Mr. Hunt's method, which was the highest possible development of the slip or hand system of tabulation and was probably offered only in order that the capacity of that system at its best might be given full consideration, be used as the standard or 100 per cent, it appears that Mr. Pidgin's method showed a relative efficiency in transcription measured by a reduction in labor time of 23.2 per cent, in tabulation measured by a reduction of 19.3 per cent, and in both combined measured by a reduction of 22.1 per cent. Upon the same basis of admeasurement Dr. Hollerith's method gave a relative efficiency in transcription showing a reduction of labor time in transcription of 49.8 per cent, in tabulation of 90.1 per cent and in the whole work of 61 per cent. In submitting these results the commission expressed the belief that in actual practice the saving in labor by the use of the Hollerith method would exceed the proportion indicated because of the increased speed in its use that would result when the employees had become as familiar with it as those engaged for the test were with the methods of the slip system.

On the subject of relative accuracy the commission said:

> As regards accuracy, the commission are of the opinion that the transcribing by the punching method is the same in accuracy as by writing on slips or chips, but that in tabulating the electrical machine is decidedly more accurate than either of the sorting methods.—Report, p. 10.

In accordance with the results of this test and the recommendation of the commission, arrangements permitting the use of the Hollerith method and machinery in the tabulation of the data concerning population and mortality were effected and the Eleventh Census is, therefore, notable as the first in which the principal tabulations were

effected with the aid of electrical mechanisms. The following official statement of the benefits which resulted appears over the signature of Mr. Porter in Part I of the Compendium:

In the Eleventh Census the card system was adopted for the tallying of results and the electrical machines were used for counting the cards. This secured results with great rapidity and accuracy, besides giving opportunity to make a more thorough analysis of the figures. By the use of the electric tabulating machines it has become possible in the present census, for the first time in the history of statistical work, to aggregate from the schedules all the information which appears in any way desirable. Heretofore the amount of such information which could be evolved from the schedules had been limited, especially in the degree of complexity of the tables. It had been possible to obtain related statistics in tabular form only to a limited extent, but with the machines the most complicated tables can be produced at no more expense than the simpler ones. * * *

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One of the most striking illustrations of the improved methods of tabulation is the fact that in 1880 conjugal condition even in its simplest form could not be tabulated, though full data regarding the same were enumerated. In 1890, however, the conjugal condition of the people will be tabulated not only as regards native white of native and foreign parentage and foreign white, but for the colored a further separation will be made as regards the blacks and those of mixed blood, and for Chinese, Japanese, and civilized Indians, distinguished as to sex and age periods.

* * * The punched card system provides a far better check against error than the old system of tallying.

Dr. Fred H. Wines, who had charge of the statistics of Crime, Pauperism and Benevolence in the Tenth and Eleventh censuses, and afterwards became Assistant Director of the Twelfth Census, described the results of the use of electrical tabulation, as follows:

The essential difference between the Eleventh Census and that which preceded it was the adoption of the card system for the tallying of results and the use of the newly invented Hollerith electrical machine for counting the cards. Too much can not be said in praise of this machine which has enabled us to compute results with much greater rapidity and accuracy than by the old method of tallying, besides giving the opportunity to make a much more thorough analysis of the figures.[4]

After the completion of the work of the Eleventh Census there was little room for doubt in the mind of anyone cognizant of the high degree of success attained through the use of the newly devised methods, that those methods would be utilized in subsequent censuses. The Director of the Twelfth Census, Hon. William R. Merriam, however, very properly determined to take nothing for granted in this connection, and at an early stage in the development of the plans for the census of 1900, provided for a second competitive and comprehensive test of the value of the various methods that were available. The results of this competition were wholly and overwhelmingly favorable to the Hollerith machinery, and in consequence contracts were arranged under which the electrical devices were utilized even more extensively than 10 years previous. The counting and sorting machinery was relied upon for the tabulation of the sta-

tistics of population and vital statistics, as 10 years before, and the method was extended by utilizing the adding machinery, as well as the counting and sorting devices, for the tabulation of the data concerning farms and agricultural production. An article in the Century Magazine for April, 1903, written by Hon. William R. Merriam, Director of the Twelfth Census, and prepared after the completion of its principal reports, contains the following résumé of the situation as he found it at the time he assumed the duties of that position:

> As the Eleventh Census approached it was clear that the scope of inquiry must be curtailed or some form of very rapid mechanical tabulation must be supplied. This requirement was effectively met; the census of 1890 is notable for the introduction of electric tabulation, the principle of which is apparently capable of responding to all the demands for many years to come.

In another place in the same article, referring directly to the work of the Twelfth Census, under his own direction, he said:

> Electric tabulation has proved a boon to the Census Office. It need only be said that if, at the Twelfth Census, the three tallies of age and sex, nativity, and occupation had been made by hand, it has been estimated that the tabulation of the statistics for these three subjects alone would have required the time of 100 clerks for 7 years, 11 months and 5 days.

The Bureau of the Census is a part of the Department of Commerce and Labor, and the Secretary of that Department, discussing in his Annual Report for 1904 (p. 24) the work of the Twelfth Census declared that—

> It has been definitely demonstrated that the application of mechanical appliances in large statistical undertakings enables work to be completed in at least one-tenth of the time required to do it by hand, at about one-third the cost, and with marked increase in accuracy.

The earliest application of an automatic feeding device, as a substitute for the manual feed, to the electrical tabulating machinery used in census work, was during the progress of the Twelfth Census, and such devices were then used in connection with sorting machines and in the work of the Division of Vital Statistics in charge of the late Mr. William A. King. The development of the automatic feed was then in its initial stages and its more extensive use was doubtless impracticable, but within a few years this device had been fully developed, it was successfully used in tabulating the Philippine Census in 1904 and 1905, and it speedily superseded the manual feed in the private use (principally in railway and manufacturing accounting and in the offices of the great insurance companies and wholesale and retail distributing establishments) of the Hollerith method except in the few instances in which the volume of work made its use unnecessary.

The utilization of the Hollerith method in the tabulations of the Thirteenth Census was confined to the work of the divisions of Population and Vital Statistics and the Census Bureau did not see fit to

arrange for the use of the automatically fed machinery which had become fully available and was then largely in use in the work of private corporations organized for profit. It is asserted, however, that it did somewhat accelerate the operation of the manually fed machines by substituting an electric motor and an electric push button for a hand-operated lever as the means of bringing the pins through which the card-control is effected in position to complete the circuit connections through the punched holes in the cards after they had been placed in position by hand. The machines of the Thirteenth Census were also equipped with printing devices by which the results were taken off, as a substitute for the former plan of transcribing these results by hand, and a considerable number of rather complicated and costly punching machines with a keyboard having some 270 characters were used, not too successfully, in lieu of the more simple and far less costly but a trifle slower devices that had formerly been used. It is stated that, within the last few weeks, the Census Bureau has perfected a new printing device which can be attached to whatever electrical tabulating machinery may be used in the census of the year 1920, with results much superior to those obtained in the Thirteenth Census.

The suggestion, heretofore made, that there is always a margin of neglected utility left by the failure to make all valuable tabulations the data for which are contained in the schedules obtained in the enumerations is not, of necessity, a criticism of census administration. Conditions wholly beyond the control of the responsible executives have often prevented the complete execution of plans wisely formulated, and legislative limitations and the failure of the Congress to provide funds for work that ought to be undertaken and completed have frequently interfered so as to extend this margin. The record would be incomplete, however, if it were not noted that the failure to tabulate the valuable data showing the number of children born, and the number living at the time of the enumeration of 1900, according to the race, occupation (if any), and nativity of the mothers, although at considerable expense to the Government these data had been duly recorded upon the punched cards, might have been obviated had not the officer who for a short time had charge of the Census Bureau during the interval between the Twelfth and Thirteenth Censuses decided that he could dispense with the Hollerith machinery. And it is impossible not to regret that, from 1910 to 1912, the Census Bureau was the only large establishment, public or private, in which the Hollerith method was in use, that did not have the benefit of the economies in time and in money that have accompanied the substitution of the automatic for the manual feed.

Few discoveries have wrought a change in methods at once so revolutionary, so complete and so extensive as those effected by Dr. Hollerith's application of the method of recording data by means of punched holes in cards or sheets. It has not only greatly extended the possibilities of demographic statistics by cheapening the processes of tabulation and permitting closer analyses of relations without any enhancement of cost over cruder and less satisfactory plans of compilation but, in a manner commonly overlooked, it has relieved the burdens of the enumerators and consequently improved the quality of their work, for it has made unnecessary the use of the family schedule, which it was once thought might have to give place to the individual schedule, and has permitted, without any loss, the revival of the older and much more convenient schedule on each of which a uniform number of individuals may be fully described. The saving to the Federal government in the three censuses in which the method has been utilized is beyond calculation, and the increase in the volume, in the refinement, and in the value of the tabulations can not be fully realized save by the student who makes daily use of the results. These advantages are so apparent that the Hollerith method has been utilized in census and similar public work in nearly every civilized country, and its abandonment is no more conceivable, in any important undertaking of this character, than any other recurrence to obsolete, extravagantly costly and inefficient methods which increased knowledge and inventive skill have displaced. The adaptability of this method has led to its extensive private use in railway and corporate accounting, in the investigation of costs of production and in other fields, although the limits upon its potential efficiency have by no means been reached. The value of the discovery has been recognized by many scientific societies and, quite 20 years ago, the Franklin Institute, of Philadelphia, accorded to Dr. Hollerith, in recognition of this achievement, the Elliot Cresson Medal, the highest distinction of that character which an American inventor can receive. In recommending this award the Committee of the Institute said, in part:

> Your subcommittee have made an examination of the Hollerith system in Washington, where they saw it in operation, and they are of the opinion that it is invaluable wherever large numbers of individual facts are to be summed and tabulated. They consider that the inventor is deserving of the greatest commendation for this useful and novel application of electricity, and strongly recommend that he be granted for his invention the highest award in the gift of the Franklin Institute.

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[1] The provision in regard to persons held in permanent servitude has not, of course, been of any consequence since the Civil War and the adoption of the Thirteenth Amendment, abolishing slavery, to the Federal Constitution.

[2] Prepared for the Senate Committee on the Census, Washington, Government Printing Office, 1900, pp. 85–87.

[3] William R. Merriam, Director of the Twelfth Census, American Census Taking, the Century Magazine, April, 1903. Reprinted (officially) by Mr. S. N. D. North, Director of the Bureau of the Census.

[4] The Electrical Engineer, Nov. 11, 1891, p. 529.

TABULATION BY MECHANICAL MEANS—THEIR ADVANTAGES AND LIMITATIONS.

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This paper is confined to a discussion of the advantages and limitations of mechanical tabulation by means of punched cards. The use of other mechanical devices—such as tallying machines, ordinary adding machines, multiplying and dividing machines, slide rules, etc.—is so familiar to all statisticians as to require no special consideration. In America very extensive use is made of all of the mechanical devices just mentioned, but, so far as governmental statistics are concerned, the use of the mechanical card-tabulating system is at present practically confined to the Bureau of the Census and to one of the bureaus of the Post Office Department. This method is, however, extensively and increasingly employed by private business concerns.

DESCRIPTION OF EQUIPMENT OF CENSUS BUREAU.

The history of the development of the card-tabulating system and the description of the machines themselves are sufficiently covered by the paper of Mr. Newcomb. A brief statement of the equipment of the Census Bureau at the present time, however, may not be inappropriate.

Punching machines.—The bureau at present uses the punched-card system only for population and vital-statistics work. The population card has 240 spaces (20 columns of 12 each) for indicating the facts regarding the individual, in addition to certain spaces for indicating the geographical location. The holes are punched either by the so-called pantograph punch, which has one key capable of being depressed into any one of 240 spaces, or by the keyboard punch, with 240 keys. On the average, about 20 holes must be punched on each card. Clerks with the keyboard machine averaged, after they had developed skill, about 1,800 to 2,000 cards per day of seven hours. The Census Bureau has 300 machines of this type, costing $250 each.

Sorting machines.—The sorting machines used by the bureau are capable of sorting by only one column at a time. Although a machine could doubtless be devised which would sort by combinations of columns, there is a limit in any case to the number of com-

partments which can conveniently be used. With the present machines, the population cards have to be sorted several times, those for certain classes of persons being sorted more frequently than those for other classes. The entire series of sorting processes represents the equivalent of sorting about 750,000,000 cards once, or an average of eight times per card. Before tabulation all cards are sorted by sex and race, and those for the white race by general nativity (i. e., birth in the United States or abroad) and parent nativity. Other sortings—according to age groups, individual country of birth for the foreign born, occupations, etc.—intervene between the several tabulation runs.

Tabulating machines.—The card-tabulating machines used by the Census Bureau merely count holes, this being all that is required in statistics of population and of births and deaths. The bureau has at present none of the so-called integrating machines which add numbers indicated by the holes and which are necessary where statistics of quantities and values are handled by the card system. The only Federal office which uses integrating machines is that which handles certain post-office accounts, but the Government is considering the introduction of such machines for tabulating statistics of exports and imports and for cost accounting generally.

The Census Bureau used during the present census 100 tabulating machines, which cost in the neighborhood of $800 each. For most of these, the cards had to be fed in by hand, the average number handled per machine per day being from 15,000 to 20,000. Seven of the machines, however, were equipped with automatic devices for feeding the cards, and this type of machine will be used almost exclusively hereafter. Each automatic machine is capable of tabulating from 300 to 400 cards per minute of continuous operation. The actual number per day depends upon the frequency with which stops have to be made to take readings. The maximum number per day of seven hours on this machine was about 150,000 cards and the average about 80,000. The hand tabulating machine requires only one operator, but for the automatic two operators are usually employed, although in some cases three operators handle two machines.

The tabulating machines have 60 counters each, arranged in six banks, but for some runs not all of the counters need to be used. On account of the complexity of the combinations to be made and the necessity of obtaining greater detail for large areas than for small, the cards are run through the tabulating machines several times. All cards go through the machines at least three times, and for certain classes (for example, the foreign born or persons engaged in gainful occupations) additional runs are required. The maximum number of runs is seven. The greatest care is required in so devising the runs as to secure the information in the most direct manner possible.

Even as it is, however, many subtotals have to be taken off which are not required, as such, but are needed as a basis for combination into two or more different kinds of group totals.

The form in which the primary totals—i. e., the totals of a given run of the cards for a given class of persons in a given area—are recorded by the machines is of great importance in relation to the cost of the subsequent work of making more comprehensive totals and preparing tables. Prior to the present census the machines used by the Census Bureau recorded only on dials, from which the readings had to be transcribed by hand on slips and these in turn transcribed into proper columns for summarization. For the census of 1910 the machines were equipped with printing counters, by which the results were printed on long tapes—one tape for each bank of 10 counters. This saved the first process of copying above mentioned, but on account of the inconvenient form of the tapes it was necessary to transcribe all of the data from them into columns for summarization. The expense of such copying and of the totalization and verification of results was very heavy. An improvement in the machines has just been perfected by the Census Bureau's experts, however, which will greatly lower this expense. By this device the horizontal space occupied by the counters is greatly reduced. Long sheets of paper of this reduced width are substituted for tapes. The readings of a bank of counters for a given group of cards will be recorded on one line and the readings for the next group will be recorded immediately below, and so on until numerous readings have been entered. Corresponding readings for the other banks will appear farther down on the same sheet. A set of duplicate counters will carry forward cumulative totals for all the readings. It will be possible with this machine to do away largely, although not wholly, with the labor of transcribing data into columns for totalization, and greatly to reduce the required amount of subsequent addition of results. This new printing and cumulating mechanism constitutes a more important improvement, from the standpoint of economy, than the substitution of automatic for hand feeding.

CONDITIONS UNDER WHICH THE CARD SYSTEM IS ADVANTAGEOUS.

In considering the advantages and limitations of the use of card-tabulating machinery, the obvious fact should be noted at the outset that the punching of cards as such is a process essentially similar to the tallying or adding of data by a machine. Where, therefore, the data are conveniently arranged for tallying or adding, and where a single process will give all the required results, it is distinctly cheaper to use a tallying or adding machine than to punch cards and perform the subsequent operations necessary to add them. There are many

classes of statistics in which a card system has no advantages over other mechanical methods, and some in which even strictly hand methods would be cheaper. In the case of many other classes of statistics, however, certain conditions are present in a degree which renders the card system the cheapest method of tabulation. The most important of these conditions may be briefly described by the following headings: (1) Intermingling of data in the original documents or schedules; (2) Necessity of combining the data according to two or more classifications; and (3) necessity of greater detail in statistics for large areas or groups of phenomena than for small areas or groups.

(1) The original documents or schedules, on which statistical data appear, often of necessity contain information of such a mixed or conglomerate character that the process of direct tallying or of direct addition of similar items by adding machines is laborious or altogether impossible. A single document relating to an importation, for example, may cover a large number of different commodities. In such cases, in order to get all commodities of a given class together, it is necessary either (1) to transcribe the data for each commodity upon a separate slip for subsequent sorting and addition or (2) to select the proper column from among a large number of columns and copy the item into it for addition or, (3) if adding machines are to be used directly, to go through the set of schedules repeatedly, selecting and adding the items for one commodity at a time. By the card system each item, or each group of items, relating to one commodity on the schedule can be recorded on a separate card, the name of the commodity being indicated by a punch symbol. The entries can thus be handled in the order in which they appear, all the cards subsequently being mechanically sorted according to commodities and mechanically added. In judging whether a card system is economical under such conditions, however, the time required to punch the symbols indicating the categories in which the items fall as well as the time required to sort and add the cards, must be set off against the time required to perform such other processes as would be necessary to accomplish the desired result.

(2) Frequently, in statistical work, the original data must be combined according to two, three, or many classifications, and often more or less complicated cross classifications are likewise required. By ordinary hand or machine methods, it is necessary either to add the data two or more times (often necessitating the copying of them into columns before addition) or to combine them into numerous small subtotals corresponding to the classifications and cross classifications, which subtotals are not of value in themselves but are necessary as a means of arriving at the desired combinations. Where such classi-

fications and cross classifications are complicated, the punched-card system has a great advantage, since only one recording of the original data is required, the combinations being made mechanically at low cost. Where combinations are fewer it is necessary to determine with care the relative cost of different methods.

(3) It is frequently desirable in statistical tabulations to present more numerous details or more complex analyses with regard to large areas or grand groups of phenomena than with regard to small areas or groups. Thus, in statistics of imports, it may be desirable to show for the country as a whole the imports of each class of articles from each country, while for a single port it may not be worth while to show anything more than the total imports of each commodity and the total for all commodities combined from each country. In such cases, unless punched cards are used, it is necessary either to add the data twice or to make subtotals, often extremely numerous, as a means of arriving at the more general totals required. With a card system the cards can at little cost be run through the machines once to take off data for the small area or group of phenomena, and a second time to take off the more detailed data for the larger area or group.

WORK FOR WHICH CARD SYSTEM IS USED IN AMERICAN CENSUS.

All three of the above-mentioned conditions may be present at the same time with reference to a piece of statistical work. This is true, for example, of the American population census. The data regarding many individuals appear upon a single sheet, which appears to be the most convenient form for enumerators to handle. Very numerous classifications and cross classifications are required; and much greater detail is considered desirable for States and large cities than for small geographical divisions. It would undoubtedly cost several times as much to make all the complicated tabulations of the population census of the United States by any other method as by the card system. In countries where the inquiries of the population census are less numerous the card system would have relatively less advantage, but I believe in most countries it would prove less expensive than any other method.

On the other hand, the American census of agriculture furnishes an example of conditions under which, while the card system might conceivably be employed, it would probably not prove economical. In the first place, each of the original agricultural schedules relates to a single farm only, but contains all the data for that farm. Again, the items for each farm are numerous, and in the case of many of the categories—such as the acreage of the farm, the value of its land and of its equipment, the number and value of its domestic animals, and the acreage, production, and value of its principal crops—corresponding

items appear on all or nearly all of the schedules, so that it is not necessary to search through numerous schedules to find one item of a given class. Moreover, the required classifications of farms for the presentation of the statistics are comparatively few. Even for the most important statistics, those relating to number and acreage of farms, the only classifications are according to (1) race (two groups), (2) tenure (three groups), and (3) size (seven groups). While theoretically the combinations of these groups might aggregate 42, in practice many of the groups do not appear in a given area. Finally, in the agricultural statistics little more detail is required for States than for the smallest area of tabulation, the county.

In view of all these conditions, it was decided, at the Thirteenth Census, after careful investigation, that the cheapest method of handling the agricultural statistics was to sort the original schedules, by hand, according to the required classifications, and then to add the items of each category for the schedules of each class in each county by means of adding machines. Wide adding machines were used, by which two, and sometimes three, related sets of items could be added at the same time in parallel columns—for example, acreage, production, and value of a specified crop. It was, of course, necessary to handle over all the schedules many times in taking off the data.

It seems possible that in the case of certain classes of items, such as minor crops which do not appear regularly, but only on occasional schedules, it may be deemed at another census more economical to use cards. The data for all the minor items of this character on a given schedule could be taken off in succession on several cards. This would eliminate the necessity of repeatedly turning over the schedules to find scattered items. In other words, it seems likely that the cheapest way of handling the American agricultural statistics in the future would be by a combination of the two methods, the great bulk of the work, however, being done by ordinary adding machines and not by cards.

VERIFICATION OF WORK.

It is somewhat more difficult to compare back the punched holes to the original schedules than to compare manuscript figures or adding-machine records. In cases where several combinations of the same data are required this disadvantage is more than offset by the fact that when the cards have once been verified any number of additions can be made from them with mechanical accuracy by the tabulating machines, whereas if several different combinations of the same data are made by ordinary adding machines comparison is necessary to verify each addition. As a matter of fact, in population work in the United States, it is believed that the errors made by the punching clerks are so much less serious than the errors

made by the enumerators in the field that not all of the cards are compared with the schedules. A selected number of cards are compared from time to time as a means of holding the clerks to reasonable care. A further partial verification is accomplished by mechanical methods; before any of the regular tabulations are undertaken all the cards are run through the tabulating machine, which is so arranged by electrical connections as to reject any card which has no hole in one of the fields where a hole is necessarily required, and also to reject cards on which inconsistencies of certain kinds appear. For example, if a card is punched to indicate that a person is 10 years old but is married, this probable inconsistency results in the rejection of the card for subsequent verification.

In cases, however, where only one or two additions of the original data are necessary to produce the desired totals, there is considerable advantage in the use of listing adding machine, because of the convenience of comparison with the original schedules, and of the scrutiny of the entries generally. One of the chief considerations which led the Census Bureau to prefer the use of ordinary adding machines to the card system in the agricultural work was the fact that errors made by the original enumerators, which of course are not detected by mere comparison with the schedules, are the more readily discovered and corrected under the former method. The adding machines used, like most adding machines, list the individual items which make up the totals, and it is much easier to examine these listed items than to examine holes in cards. Enumerators not infrequently make inconsistent entries on the agricultural schedules, or omit certain required entries. For example, the acreage of a given crop may be entered, but not the production; or a production 10 times as great as it should be may be entered by accidental addition of a cipher. Instead of editing the schedules in advance to detect such inconsistencies, the Census Bureau employed skilled clerks to run rapidly through the individual items as listed by the adding machines—a method which proved both economical and effective.

DESIGNATION OF ARBITRARY SYMBOLS FOR PUNCHING.

The most satisfactory punching machine in many respects is a very simple one having only 10 or 12 keys, numbered serially. With this machine the proper one hole (or occasionally two holes) is punched in the first column, and the card then moves forward to receive the proper hole in the next column. This machine is the least expensive and the easiest to operate of any of the punching machines thus far devised. Difficulty arises, however, in the use of this simple machine from the fact that many statistical data do not consist of numbers,

this, of course, being notably true in population work. It is necessary to assign numerical symbols to items of this character, and these symbols must either be memorized by the punching clerk or marked by a special set of clerks on the schedules in advance of punching. Where the symbols are few and simple, punching clerks can readily memorize them, but if they are numerous and complicated, errors are bound to result unless the schedules are marked.

In view of these difficulties with the small machine, the Census Bureau has heretofore, for population work, used exclusively the two types of punching machines above mentioned, with 240 spaces or keys. On these spaces or keys the ages were, of course, expressed in numbers, but most of the other possible entries were indicated by abbreviations of the significant words. On account of the very large number of occupations, however, it was impossible to use such abbreviations, and arbitrary numerical symbols were assigned. Punching clerks were required to memorize the symbols for the more common occupations, but the others were left blank when the cards were first punched. After the cards had been tabulated with reference to facts other than occupations, these incomplete cards were sorted back into their original order—a very laborious process. Meantime the symbols for the missing occupations were marked upon the schedules by skilled clerks, and the cards are now being completed by a special force of punching clerks. This procedure, which was devised with a view to saving time in the compilation of the more important population data, seems unduly expensive, and it will probably be deemed preferable at future censuses to mark the symbols for all occupations upon the schedules before they go to the punching clerks at all. If the Government did not already own the keyboard punching machines, it would probably be considered most advantageous to go further, and, in order to permit the use of the simple 10 or 12 key machines above mentioned, to mark numerical symbols for subjects other than occupations on the schedules in advance. Of course, for the simplest classifications, such as sex, color, and marital condition, preliminary marking of symbols would be unnecessary, as the punching clerks could easily memorize them. For data such as commercial statistics, where the greater part of the entries to be tabulated are already expressed in numbers, and where only a limited number of categories need to be indicated by arbitrary symbols, there can be no question that the simplest type of punching machine is the most economical.

WEDNESDAY MORNING, SEPTEMBER 25, 1912.

MUNICIPAL VITAL STATISTICS IN GERMANY.

Dr. Eugen Würzburger, Director of the Royal Statistical Office of Saxony, Dresden.

The most important general data concerning vital statistics, such as the numbers of births, marriages, and deaths occurring each week, month, and year, are regularly reported for all the larger towns is Germany. The remarkable feature of municipal vital statistics, however, is not what is regularly and uniformly tabulated, but the exceptional and special tables prepared by certain cities. The tables of this kind contain much interesting and valuable information, partly by combining data usually to be had only separately, and partly by tabulations made on the basis of special inquiry.

In order to make clear how this multiplicity is possible in spite of the uniformity of the registers prescribed by the imperial law, we need but glance at the matter of registration. Yesterday we heard what is the present condition of vital statistics in the United States. In Germany registration was in the hands of the church up to the year 1875, but since that date it has been regulated by imperial law. Registration offices now exist throughout the Empire which keep what is called the register of personal status (Personenstandesregister), in which is entered every fact required in regard to every birth, marriage, and death. The persons immediately concerned in any such event are compelled by law to furnish a number of facts to the registrar's office.

These data, however, are required not only for statistical purposes but for administrative purposes as well. Whenever they are used for statistical purposes then, to use an expression introduced by Georg von Mayr, they constitute secondary statistics only. Not the registers themselves but only copies furnished by the registrar to the statistical offices are used directly for statistical tabulation. What must be included in these copies, each Federal State decides of its own authority and for its own territory. The states draft statistical tables and send to the imperial statistical office the uniform reports required for the Empire. These imperial reports are rather short.

All the Federal States, however, through their respective registrar's offices, have copies made of a larger number of data than are necessary for the imperial statistics.

In addition, several Federal States have introduced primary statistical inquiries by prescribing that the registrar's office be furnished with still other data which are wanted, not for administrative but for statistical purposes. For instance, for births in the Kingdom of Saxony it is required to state (*a*) according to the imperial law, the day, hour and place of birth; the sex of the child; whether legitimate or illegitimate; whether living or stillborn; whether a multiple birth; the occupation, residence and religion of the parents or of the unmarried mother; (*b*) according to the law of the Kingdom, the birthdays of the parents, the number of children of the same marriage, and how many were of the same sex as the new born; the date of the parent's marriage; how many times either had been married before; whether the mother was confined in a public establishment. Finally, a few cities have been authorized by their governments to require still other data for their own special statistical investigations. And this explains why the statistical data at the disposal of the different cities are of a diverse nature.

A still greater difference exists in regard to the tabulating itself. In my brochure entitled "Survey of the tables concerning vital statistics, elaborated in the last 25 years by the several statistical offices of the German Empire," and published in von Mary's Statistisches Archiv (1909), the mere titles of the tables gotten up by the municipal statistical offices require more than 50 printed pages.

With special reference to the particular hygienic object of this Congress I will name only a few of these:

1. *Births.*—A table published by the statistical office of the city of Dresden showing in how many cases a child born as the second, third, etc., child of a marriage has been the first, second, third, etc., boy; or the first, second, third, etc., girl.

2. *Marriages.*—A table published by the statistical office of the city of Kiel, indicating the previous marital condition of the bride and groom, combined with their religion and the number of children born of former marriages.

3. *Deaths.*—A table published by the statistical office of the city of Berlin, showing how many deaths from phthisis, how many from intestinal diseases and from cancer occurred in dwellings with 1, 2, 3, etc., rooms, combining this data with the number of inhabitants in each dwelling, together with sex and religion, the latter being important because it is to a certain degree the key to the economic position.

Unfortunately, the brochure mentioned, which contains no tables, but merely table headings, is the only one that will guide the statistician to the rich mine offered by the municipal statistical offices for the profounder study of problems dealing with demography.

The excellent Statistisches Jahrbuch der deutscher Städte, edited by Prof. Neefe,of Breslau, has for its object to compare the municipal statistical reports of the whole Empire, and therefore the more detailed tables I spoke about are not taken into consideration, being only elaborated sporadically and being not comparable to each other.

1. *List of information which is collected about every marriage, birth, death, divorce, and legitimation of every illegitimate child, for the statistics in the 43 cities of the German Empire.*

According to the regulations of the Bundesrat every State has to compile annually for the general statistics of the Empire certain uniform tables on the movement of population. These tables are furnished by the bureaus of statistics of the separate States. In a few States the local authorities of some large cities which have their own bureaus of statistics are allowed to prepare these tables. Most of the States collect, through their bureaus of statistics, more information about the movement of population than is required for the statistics of the Empire. Several of the cities which prepare the tables themselves gather, with the consent of the State, more information than is required by State or Empire.

Of the following cities, Munich and Nuremberg belong to the Kingdom of Bavaria; Chemnitz, Dresden, Leipzig, and Plauen to the Kingdom of Saxony; Stuttgart belongs to the Kingdom of Wurtemberg; Freiburg, Karlruhe and Mannheim to the Grand Duchy of Baden; Mainz belongs to the Grand Duchy of Hesse; Strassburg to Alsace-Loraine; Brunswick, Bremen, Hamburg, and Lubeck to the States of the same name; all the others to the Kingdom of Prussia.

MARRIAGES.

	Subject.	Aachen (156,143).	Altona (172,628).	Barmen (169,214).	Berlin (2,071,257).	Brunswick (143,552).	Bremen (244,875).	Breslau (512,105).	Cassel (153,196).	Charlottenburg (305,975).	Chemnitz (287,807).	Cologne (516,527).	Deutsch Wilmersdorf (109,716).	Dortmund (214,226).	Dresden (548,308).	Dusseldorf (358,728).	Duisburg (229,483).
1	Date of marriage	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Names of contracting parties	+	+	+	+	+	−	+	+	+	+	+	+	+	+	+	+
3	Date of birth of contracting parties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	Place of birth of contracting parties	+	+	+	+	+	+	+	+	+	+	+	+	−	+	+	+
5	Former residence of contracting parties	−	−	−	+	−	(a)	−	−	−	−	−	−	−	+	−	−
6	Future residence of contracting parties	−	−	−	−	−	+	−	−	−	−	−	−	−	−	−	−
7	Religion of contracting parties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8	Marital condition of contracting parties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9	Occupation of contracting parties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10	Nationality of the man	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
11	Nationality of the woman up to marriage	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
12	Number of the marriage for each party	−	−	−	+	−	+	−	−	−	+	−	−	−	+	−	−
13	Was the previous marriage of one or both ended by death or by divorce?	−	−	−	+	−	−	−	−	−	−	−	−	−	−	−	−
14	Consanguinity	+	+	+	+	+2	+	+	+	+	+2	+	+	+	+2	+	+
15	Was the marriage document signed personally?	+	+	+	+	+	+	+	+	+	−	+	+	+	+	+	+
16	Number and age of the children legitimated by this marriage	−	−	−	−	+	−	−	−	−	−	−	−	−	−	−	−
17	Was dispensation given on account of minority or other obstacles to marriage?	+	+	+	+	−	+	+	+	+	−	+	+	+	−	+	+
18	Others: (1) In case one or both of the parties had their own residence in the city, this has to be given: (2) Cousins? (2) Uncle and niece? (2) Nephew and aunt? (3) Affinity? (4) If not answered, why not? (5) Also sex. (6) Occupation of parents, in case the bride was not self-supporting before marriage	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

BIRTHS.

1	Day and hour as well as place of birth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Name of the child	+	+	+	+	+	−	+	+	+	+	+	+	+	+	+	+
3	Sex	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	Whether legitimate or illegitimate	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	Plural birth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	Living or stillbirth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	Special questions about the place of birth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8	Name of parents	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
9	Residence of parents	−	−	−	+	−	+	−	−	−	−	−	−	−	−	−	−
10	Occupation of parents	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11	Age of parents	−	−	−	+	(b)	+	−	−	−	+	−	−	−	+	−	−
12	Religion of parents	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
13	Number of previous children of this mother	−	−	−	−	−	+	−	−	−	+	−	−	−	+	−	−
14	Number of previous children to this marriage	−	−	−	+	−	−	−	−	−	+2	−	−	−	+2	−	−
15	Date of marriage	−	−	−	−	−	−	−	−	−	+	−	−	−	+	−	−
16	Number of the marriage of both parents	−	−	−	−	−	−	−	−	−	+	−	−	−	+	−	−
17	In regard to illegitimate births	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
18	Others	−	−	−	−	−	4	−	−	−	−	−	−	−	7	−	−

DEATHS AND CAUSES OF DEATH.

1	Day, hour, and place of death	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Name of deceased	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	Date of birth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	Sex	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	Marital condition	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	Occupation	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	Place of residence	+	+	+	+	−	+	+	+	+	+8	+	+	+	+	+	+
8	Address	−	−	−	+	−	+	−	−	−	−	−	−	−	+	−	−
9	Birthplace	−	−	−	+	−	+	−	−	−	+9	−	−	−	+	−	−
10	Religion	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11	Occupation of those supporting him	(c)	(c)	(c)	(c)	(c)	(d)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)
12	Whether without father and mother	−	−	−	−	+	−	−	−	−	+	−	−	−	+	−	−
13	Age of children in hours	−	−	(e)	−	−	−	−	−	−	−	−	−	−	−	−	−
14	Legitimate or illegitimate children aged ..... years	−1	−1	−1	−5	−5	−5	−1	−1	−1	−5	−1	−1	−1	−5	−1	−1
15	In case of children in the first year of life, how long were they fed on mother's milk? How long on nurse's milk?	−	−	−	−	−	−	−	−	−	−	−	−	−	+	−	−
16	How often married?	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
17	Duration of last marriage	+	+	+	+	+	−	+	+	+	+	+	+	+	+	+	+
18	Questions referring to existence of legitimate children	−	−	−	−	−	−	−	−	−	10	−	−	−	−	−	−
19	Cause of death	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
20	Whether attended by physician	−	−	−	−	−	−	−	−	−	.....	−	−	−	−	−	−
21	Whether cause of death was certified by physician	+	+	+	−	−	−	+	+	+	.....	+	+	+	+	+	+
22	Others	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

a Woman only. b Mother only. c Dependent children under 15 years. d Unemployed. e Fifteen days or less.

I. *List of information which is collected about every marriage, birth, death, divorce, and legitimation of every illegitimate child, for the statistics in the 43 cities of the German Empire*—Continued.

DECREES OF DIVORCE.

	Subject.	Aachen (156,143).	Altona (172,628).	Barmen (169,214).	Berlin (2,071,257).	Brunswick (143,552).	Bremen (244,875).	Breslau (512,105).	Cassel (153,196).	Charlottenburg (305,975).	Chemnitz (287,807).	Cologne (516,527).	Deutsch Wilmersdorf (109,716).	Dortmund (214,226).	Dresden (548,308).	Dusseldorf (358,728).	Duisburg (229,483).
1	Occupation of the husband	+	+	+	+	–	–	+	+	+	+	+	+	+	+	+	+
2	Is the schedule filled out by—(*a*) Court? (*b*) Marriage bureau?	(*a*)	(*a*)	(*a*)	(*a*)	–	–	(*a*)	(*a*)	(*a*)	(*a*)	(*b*)	(*a*)	(*a*)	(*a*)	(*b*)	(*a*)
3	Does the return include, besides divorces, also—(*a*) Declarations of nullity? (*b*) Decrees of separation?	(*b*)	(*b*)	(*b*)	(*b*)	–	–	(*b*)	(*b*)	(*b*)	(*a*)	(*b*)	(*b*)	(*b*)	(*a*)	(*b*)	(*b*)
4	Place of marriage	–	–	–	–	–	–	–	–	–	+	–	–	–	+	–	–
5	Last residence of husband	+	+	+	+	–	–	+	+	+	–	+	+	+	+	+	+
6	Nationality	(*c*)	(*c*)	(*c*)	(*c*)	–	–	(*c*)	(*c*)	(*c*)	+	(*c*)	(*c*)	(*c*)	+	(*c*)	(*c*)
7	Date of birth of husband and wife	+	+	+	+	–	–	+2	+	+	+	+	+	+	+	+	+
8	Religion of husband and wife	+2	+2	+2	+2	–	–	+2	+2	+2	+2	+	+2	+2	+2	+	+2
9	Date of marriage	+	+	+	+	–	–	+	+	+	+	+	+	+	+	+	+
10	Applicant	+	+	+	+	–	–	+	+	+	–	+	+	+	–	+	+
11	Date when decree becomes effective	+	+	+	+	–	–	+	+	+	+	+	+	+	+	+	+
12	Cause of divorce or nullity; guilty party—(*a*) according to paragraphs of the civil code; (*b*) with further classification	(*a*)	(*a*)	(*a*)	(*a*)	–	–	(*a*)	(*a*)	(*a*)	(*a*, *b*)	(*a*)	(*a*)	(*a*)	(*a*, *b*)	(*a*)	(*a*)
13	Other causes for divorce presented	–	–	–	+	–	–	–	–	+	–	–	–	–	–	–	–
14	Questions in regard to children	(*d*)	(*d*)	(*d*)	(*d*)	–	–	(*d*)	(*e*)	(*d*)	(*d*)	(*d*)	(*e*)	(*d*)	(*d*)	(*d*)	(*d*)
15	Whether relief as a pauper is granted to husband? To wife?	+	+	+	+	–	–	+	+	+	–	+	+	+	–	+	+
16	Was defendant represented in court?	+	+	+	+	–	–	+	+	+	–	+	+	+	–	+	+

LEGITIMATION OF CHILDREN.

1	Sex of children	–	–	–	–	–	+	–	–	–	+	–	–	–	+	–	–
2	Date of birth of children	–	–	–	–	–	+	–	–	–	+	–	–	–	+	–	–
3	Birthplace of children	–	–	–	–	–	+	–	–	–	+	–	–	–	+	–	–
4	Place of marriage of parents	–	–	–	–	–	+	–	–	–	+	–	–	–	+	–	–
5	Does the return include, besides cases of legitimation through marriage of the parents, also cases of legitimation by administrative decree?	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6	Cases of legitimation through marriage of the parents are determined by notes upon the—(*a*) birth register; (*b*) marriage register	–	–	–	–	–	(*a*, *b*)	–	–	–	(*a*)	–	–	–	(*a*)	–	–

		Elberfeld (170,195).	Essen on the Ruhr (294,653).	Frankfort on the Main (414,576).	Freiburg (33,324).	Goelitz (95,806).	Halle on the Saale (1808,43)	Hamburg (931,035).	Hanover (302,375).	Karlsruhe (134,313).	Kiel (211,627).	Konigsberg (245,994).	Leipzig (589,850).	Linden (73,379).	Lubeck (98,656).	Magdeburg (279,629).	Mainz (110,634).	Mannheim (193,902).	Munich (596,467).	Neukolln (237,289).	Nuremberg (333,142).	Plauen (121,272).	Posen (156,691).	Schoneberg (172,823).	Stettin (236,113).	Strassburg (178,891).	Stuttgart (286,213).	Weisbaden (109,002).
7	Date of marriage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(f)	—	—	—	+	—	—	—	+	—	—
8	Date of entry of legitimation upon official register																											
9	Religion of father and mother	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	+	—	—
10	Residence of father and mother at time of legitimation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	+	—	—	—	+	—	—
11	Occupation of father; of mother, if working	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+2	—	—	—	(g)	—	—	—	(g)	—	—

MARRIAGES.

	Elberfeld (170,195).	Essen on the Ruhr (294,653).	Frankfort on the Main (414,576).	Freiburg (33,324).	Goelitz (95,806).	Halle on the Saale (1808,43)	Hamburg (931,035).	Hanover (302,375).	Karlsruhe (134,313).	Kiel (211,627).	Konigsberg (245,994).	Leipzig (589,850).	Linden (73,379).	Lubeck (98,656).	Magdeburg (279,629).	Mainz (110,634).	Mannheim (193,902).	Munich (596,467).	Neukolln (237,289).	Nuremberg (333,142).	Plauen (121,272).	Posen (156,691).	Schoneberg (172,823).	Stettin (236,113).	Strassburg (178,891).	Stuttgart (286,213).	Weisbaden (109,002).
1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	(a,b)	+	+
3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	—	—	—	+	—	—	(h)	—	+	—	—	—	—	(h)	—	—	+	—	—	—	—	—	+1	—	—	—	—	—
6	—	—	—	—	—	—	+	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—	—	—	—	—
7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10	—	—	—	+	—	—	—	—	+	—	—	—	—	+	—	—	+	—	—	—	—	—	—	—	—	—	—	—
11	—	—	—	+	—	—	—	—	+	—	—	—	—	+	—	—	+	—	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	+	—	+	—	—	+	—	—	—	+	+	—	—	—	+	—	—	—	+	—	—	—
13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—	—
14	+	+	+	+2	+	+	—	+	+2	+	+	+2	+	+	+	+3	+2	+	+	+	+2	+	+	+	+	+	+	+
15	+	+	+	+4	+	+	—	+	+4	+	+	—	+	—	+	+	+4	+	+	+	—	+	+	+	+	(i)	—	+
16	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—	+5	—	+	—	+	+	—	—	—	—	+5	—	—
17	+	+	+	+	+	+	—	+	+	+	+	—	+	—	+	—	+	—	+	—	—	+	+	+	—	—	—	+
18	—	—	—	6	—	—	—	—	6	—	—	—	—	—	—	—	6	—	—	—	—	—	—	—	—	—	7	—

a Man only.
b Refers to old schedule for Alsace-Lorraine.
c German or foreign.
d Living children under age.
e Living children.
f Only in case of reference to marriage register (66).
g Father.
h Woman only.
i Refers to new schedule for Alsace-Lorraine.

I. *List of information which is collected about every marriage, birth, death, divorce, and legitimation of every illegitimate child, for the statistics in the 48 cities of the German Empire*—Continued.

BIRTHS.

	Elberfeld (170,195).	Essen on the Ruhr (294,653).	Frankfort on the Main (414,576).	Freiburg (83,324).	Goelitz (85,806).	Halle on the Saale (180,843)	Hamburg (931,035).	Hanover (302,375).	Karlsruhe (134,313).	Kiel (211,627).	Konigsberg (245,994).	Leipzig (589,850).	Linden (73,379).	Lubeck (98,656).	Magdeburg (279,629).	Mainz (110,634).	Mannheim (193,902).	Munich (596,467).	Neukolln (237,289).	Nuremberg (333,142).	Plauen (121,272).	Posen (156,691).	Schoneberg (172,823).	Stettin (236,113).	Strassburg (178,891).	Stuttgart (286,213).	Weisbaden (109,002).
1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	+	−	+	−	+	+	+	+	+	−	+
3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	(a)	+	+
4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	+	+	+	+	+	+	−	+	+	+	+	+	+	−	+	+	+	+	+	+	+	+	+	+	(b)	+	+
8	−	−	−	+	−	−	+	−	+	−	−	−	−	+	−	−	+	−	−	−	−	−	+	−	−	−	−
9	−	−	−	+	−	−	+	−	+	−	−	−	−	+	−	−	+	−	−	−	−	−	−	−	−	−	−
10	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11	−	−	+	+	−	−	+	+	+	−	+	+	−	+	−	+	+	+	+	+	+	+	+	+	(a, c)	−	+
12	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	+
13	−	−	−	−	−	−	−	−	−	−	−	+	−	−	−	+	−	−	−	−	+	−	+	−	−	−	−
14	−	−	−	−	−	−	−	−	−	−	−	+2	−	−	−	+	−	−	−	−	+2	−	+	−	+	−	−
15	−	−	−	−	−	−	−	−	−	−	−	+	−	−	−	−	−	−	−	−	+	−	+	−	−	−	−
16	−	−	−	−	−	−	−	−	−	−	−	+	−	+3	−	+	−	−	−	−	+	−	−	−	−	−	−
17	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	5	−	−	−	−	−	−	−	−	−	6	−
18	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

DEATHS AND CAUSES OF DEATH.

1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	+	−	+	−	+8	+	+	+	+	−	+
8	−	−	−	−	−	−	+	−	−	−	−	−	−	+	−	−	−	−	−	−	−	−	+	+	+	−	−

9	−	−	−	−	−	−	+	−	−	−	−	+9	−	+	−	−	−	−	−	−	+9	−	+	−	−	−	−	−
10	+	+	+	+	+	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)	(e)	(d)	(d)	(d)	(d)	(d)	(d)	(d)	(e)	3	(d)	3	(d)	(d)	(d)	(d)	(d)	(e)	(d)
12	−	−	−	−	−	−	−	−	−	−	−	+	−	+	−	−	−	−	−	−	+	−	−	−	−	−	−	−
13	−	−	−	b−1	−	−	b−8	−	b−1	−	−	−	−	−	−	b 8	b 1	−	−	−	−	−	−	−	−	−	−	−
14	−1	−1	−1	−14	−1	−1	−14	−14	−1	−1	−15	−1	−5	−1	−5	−5	−14	−15	−1	−15	−15	−1	−1	−14	−15	−5	−1
15	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
16	−	−	−	+	−	−	−	−	+	−	−	−	−	−	−	+	+	−	−	+	−	+	+	+	+	−	+
17	+	+	+	−	+	+	−	+	−	+	+	+	+	−	+	−	−	−	−	−	−	−	−	−	−	−	−
18	−	−	−	−	−	−	−	−	−	−	−	10	−	−	−	(f)	−	−	−	−	10	−	−	−	(f)	−	−
19	+	+	+	+	+	+	+	+	+	+	+	+7, 11	+	+2	+	+	−	+4	+	+4	+7, 11	+	+	+	+6, 11	+	+
20	−	−	−	(g)	−	−	−	−	(g)	−	−	12	−	−	−	−	+	+4	−	+4	12	−	−	−	+	+	−
21	+	+	+	(g)	+	+	−	+	(g)	+	+	12	+	−	+	−	(g)	+4	+	+4	12	+	−	+	+	−	+
22	−	−	−	5	−	−	−	−	5	−	−	−	−	−	−	−	5	−	−	−	−	−	−	−	−	−	−

DECREES OF DIVORCE.

1	+	+	+	+	+	+	−	+	+	+	+	+	+	−	+	−	+	−	+	−	+	+	+	+	−	−	+
2	(h)	(h)	(h)	(h)	(h)	(h)	−	(h)	(h)	(h)	(h)	a1	(h)	−	(h)	−	(h)	−	(h)	−	(a)	(h)	(h)	(h)	−	−	(h)
3	(a)	(a)	(a)	(h)	(a)	(a)	−	(a)	(h)	(a)	(a)	(h)	(a)	−	(a)	−	(h)	−	(a)	−	(h)	(a)	(a)	(a)	−	−	(a)
4	−	−	−	−	−	−	−	−	−	−	−	+	−	−	−	−	−	−	−	−	+	−	−	−	−	−	−
5	+	+	+	+	+	+	−	+	+	+	+	−	+	−	+	−	+	−	+	−	−	+	+	+	−	−	+
6	(i)	(i)	(i)	+	(i)	(i)	−	(i)	+	(i)	(i)	+	(i)	−	(i)	−	+	−	(i)	−	−	(i)	(i)	(i)	−	−	(i)
7	+	+	+	−	+	+	−	+	−	+	+	+	+	−	+	−	−	−	+	−	+	+	+	+	−	−	+
8	+2	+2	+2	−	+2	+2	−	+2	−	+2	+2	+	+2	−	+2	−	−	−	+2	−	+	+2	+2	+2	−	−	+2
9	+	+	+	+	+	+	−	+	+	+	+	+	+	−	+	−	+	−	+	−	+	+	+	+	−	−	+
10	+	+	+	+	+	+	−	+	+	+	+	−	+	−	+	−	+	−	+	−	−	+	+	+	−	−	+
11	+	+	+	+	+	+	−	+	+	+	+	+	+	−	+	−	+	−	+	−	+	+	+	+	−	−	+
12	(h)	(h)	(h)	(h)	(h)	(h)	−	(h)	(h)	(h)	(h)	(h, a)	(h)	−	(h)	−	(h)	−	(h)	−	(h, a)	(h)	(h)	(h)	−	−	(h)
13	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
14	(j)	(j)	(j)	−	(j)	(j)	−	(j)	−	(j)	(j)	(k)	(j)	−	(j)	−	−	−	(j)	−	(k)	(j)	(j)	(j)	−	−	(j)
15	+	+	+	−	+	+	−	+	−	+	+	−	+	−	+	−	−	−	+	−	−	+	+	+	−	−	+
16	+	+	+	−	+	+	−	+	−	+	+	−	+	−	+	−	−	−	+	−	−	+	+	+	−	−	+

a Refers to old schedule for Alsace-Lorraine.
b Refers to new schedule for Alsace-Lorraine.
c Mother only.
d Dependent children under 15 years.
e Married women and children under 14 years.
f Number of children by last marriage.
g Name and address.
h Man only.
i German or foreign.
j Living children under age.
k Living children.

I.—*List of information which is collected about every woman, birth, death, divorce, and legitimation of every illegitimate child, for the statistics in the 43 cities of the German Empire*—Continued.

LEGITIMATION OF CHILDREN.

	Elberfeld (170,195).	Essen on the Ruer (294,653).	Frankfort on the Main (414,576).	Freiburg (83,324).	Goelitz (85,806).	Halle on the Saale (180,343).	Hamburg (931,035).	Hanover (302,375).	Karlsruhe (134,313).	Kill (211,627).	Konigsberg (245,994).	Leipzig (589,850).	Linden (73,379).	Lubec (98,656).	Magdeburg (279,629).	Mainz (110,634).	Mannheim (193,102).	Munich (596,467).	Neukolin (237,289).	Nuremberg (333,142).	Plauen (121,272).	Posen (156,691).	Schoneberg (172,823).	Stettin (236,113).	Strassburg (178,891).	Stuttgart (286,213).	Weisbaden (109,002).
1	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—	+	—	—	—	—
2	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—	+	—	—	—	—
3	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—	+	—	—	—	—
4	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—	+	—	—	—	—
5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—
6	—	—	—	—	—	—	—	—	—	—	—	(a)	—	—	—	—	—	—	—	—	(a)	—	(a, b)	—	—	—	—
7	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—	+	—	—	—	—
8	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	(c)	—	—	—	—	—	—
11	—	—	—	—	—	—	—	—	—	—	—	(c)	—	—	—	—	—	—	—	—		—	—	—	—	—	—

a Man only. b Refers to old schedule for Alsace-Lorraine. c Father.

II. *List of subjects dealt with in the statistics of marriages, births, and deaths in the 43 cities of the German Empire within the last quarter of a century.*

Compare introductory remarks to Table I. Tables mentioned here are found partly in the publications of the State bureaus of statistics, partly in publications of the municipal statistical bureaus, partly only in manuscript. Particulars about this are to be found in my article, Die Bearbeitung der Bevolkerungsbewegung im deutschen Reiche (Supplement to Von Mayr's Allgemeines Statistisches Archiv., Vol. VII. Tubingen, 1909).

MARRIAGES.

		Aachen.	Altona.	Barmen.	Berlin.	Brunswick.	Bremen.	Breslau.	Cassel.	Charlottenburg.	Chemnitz.	Cologne.	Wilmersdorf.	Dortmund.	Dresden.	Dusseldorf.	Duisberg.
1	Age and difference in age of the parties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Age and marital condition of the parties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	Number of previous marriages, combined with age, year of birth, marital condition, manner in which former marriages were ended, as well as duration of unmarried state of those remarrying	−	−	−	+	−	−	+	−	−	+	−	−	+	−	−	−
4	Nationality, place of birth, and former place of residence of the parties	−	+	−	+	−	−	+	−	+	+	+	+	+	+	+	+
5	Marriage and occupation of parties	+	+	+	+	+	−	+	+	+	+	+	+	+	+	+	+
6	Religion of the parties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	Other characteristics of the parties (education, blood relationship, and so on)	+	+	+	+	−	−	+	+	+	−	+	+	+	−	+	+

BIRTHS.

		Aachen.	Altona.	Barmen.	Berlin.	Brunswick.	Bremen.	Breslau.	Cassel.	Charlottenburg.	Chemnitz.	Cologne.	Wilmersdorf.	Dortmund.	Dresden.	Dusseldorf.	Duisberg.
1	Age and difference in age of parents	−	−	−	+2,3	+	−	+2,3	−	+	+	−	−	−	+2	−	−
2	Place of residence (marital condition) of the mother, as well as birthplace and nationality of child	+	+	+	+	−	−	+	+	+	−	+	+	+	+	+	+
3	Births classified by occupation of the parents	+	+	+	+	+	+	+2,3	+	+	+	+	+	+	+	+	+
4	Births classified by religion of parents	+	+	+	+	+	−	+	+	+	+	+	+	+2	+	+	+
5	Other characteristics of parents (number of the marriage and so on)	−	−	−	−	−	−	−	−	+	+	−	−	−	+	−	−
6	Order or number of the birth, time between marriage and first birth, or between any two births	−	−	−	+2,3	−	−	−	−	+	+	−	−	−	+	−	−
7	Other conditions at birth	−	−	−	+	−	−	−	−	+	−	−	−	−	−	−	−
8	Plural births	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

II. *List of subjects dealt with in the statistics of marriages, births, and deaths in the 43 cities of the German Empire within the last quarter of a century*—Continued.

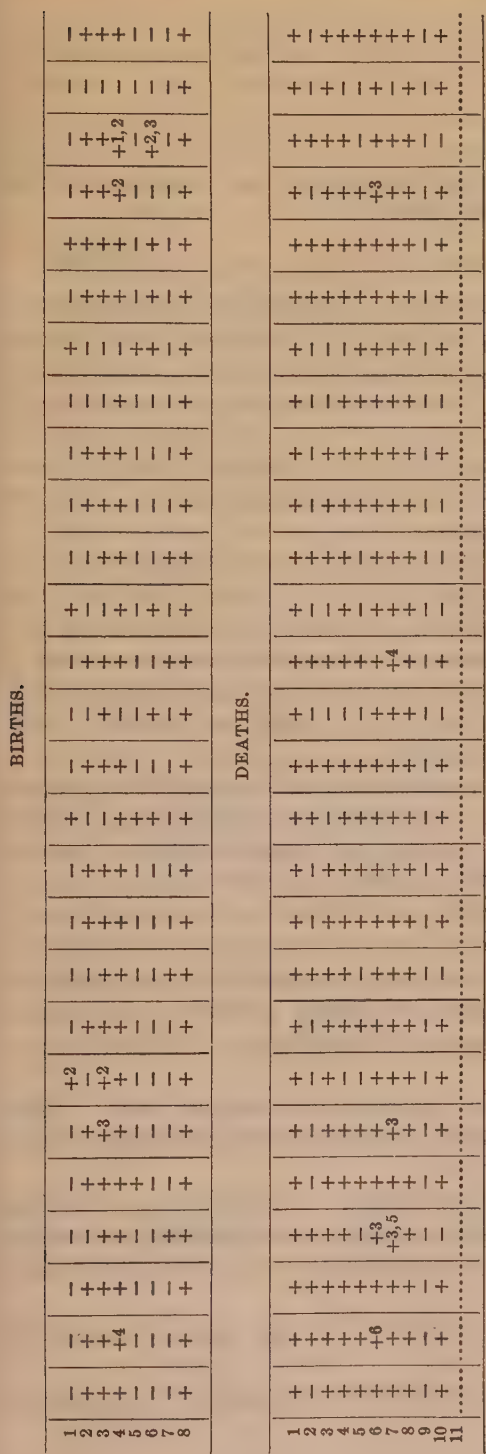
DEATHS.

		Aachen.	Altona.	Barmen.	Berlin.	Brunswick.	Bremen.	Breslau.	Cassel.	Charlottenburg.	Chemnitz.	Cologne.	Wilmersdorf.	Dortmund.	Dresden.	Dusseldorf.	Duisberg.
1	Age of deceased, also with reference to year of birth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Marital condition	−	−	−	+	−	−	+	−	−	−	−	−	+	−	−	+
3	Nativity and residence	−	−	−	+	−	−	+	−	−	−	−	−	+	−	+	+
4	Occupation	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	Religion	+	+	+	+	+	−	+	+	+	−	+	+	+	+	+	+
6	Duration of the marriage dissolved by the death	+	+	+	+	−	−	+	+	+	+	+	+	+	+	+	+
7	Deaths classified by cause	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+[3]
8	Mortality and cause of death of children under 5 years; also method of feeding infants	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9	Unnatural causes of death	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10	Time of death	−	−	−	+	−	−	−	−	−	+	−	−	−	+	−	−
11	Mortality tables[a]	+	+	+	+	−	−	+	+	+	+	+	+	+	+	+	+

MARRIAGES.

	Elberfeld.	Essen on the Ruhr.	Frankfort on the Main.	Freiburg.	Goelitz.	Halle.	Hamburg.	Hannover.	Karlsruhe.	Kiel.	Konigsberg.	Leipzig.	Linden.	Lubeck.	Magdeburg.	Mainz.	Mannheim.	Munich.	Neukölln.	Nuremberg.	Plauen.	Posen.	Schöneberg.	Stettin.	Strassburg.	Stuttgart.	Weisbaden.
1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	−	−	−	+	−	−	+	−	+	+	−	+	−	−	+	+	+	+	+	+	+	+	+	+	+	+	+
4	+	−	+	+	−	−	+	+	+	+	+	+	−	−	+	+	+	+	−	−	+	−	−	−	−	−	−
5	+	+	+	−	+	+	−	+	−	+	+	−	+	−	+	+	+	+	+	−	−	+	+	−	+	+	+
6	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	+	+	+	+	+	+	+	+	+	+	+	−	+	−	+	+	+	+	+	+	−	+	+	+	+	−	+

[a] (1) Classified by marital condition, (2) as to living or stillbirths, (3) classified as to parentage, (4) also time of year of birth, (5) also nativity, (6) classified by marital condition.


BIRTHS.
DEATHS.

MUNICIPAL STATISTICS OF THE MOVEMENT OF POPULATION IN BELGIUM.

M. Maurice Sauveur, Director General, Royal Bureau of Statistics, Brussels.

The Belgian communes are required to furnish the central government annually a number of statistical tables giving data about the movement of population. They prepare these tables from two sources, the registers of civil condition and the registers of population.

In the former, births, marriages, and deaths are entered. These records are kept by the officer of civil condition, who is a member of the sheriff's college (échevinal).

The registers of population contain the list of inhabitants of the commune grouped by households. They are kept up to date, for the names of persons who take up an abode in the commune are inscribed on them and the names of those who leave are erased.

As these registers are peculiar to the local administration of Belgium and can render much service to municipal statistics, they will later be somewhat fully described.

In Belgium the registration statistics are decentralized, each commune maintaining its own statistics and sending them to the central bureau which verifies, checks, and consolidates the results and then groups them by arrondissements and Provinces.

This system has disadvantages, but it has one fortunate result; it compels the local authorities to interest themselves in registration statistics and brings home to them the advantage of having registers well kept and having under their own hands accurate and detailed returns of all the factors influencing the condition of the local population.

These municipal statistics in Belgium go back to 1841. Then the Government required the local administrations to prepare three tables annually:

1. A general table of the movement of population, including legitimate and illegitimate births, births of twins, stillbirths, deaths, marriages, divorces, changes of residence as well as the population at the end of the year.

2. A table showing deaths classified by age and by month of occurrence.

3. A table showing marriages classified by age and previous marital condition of the parties.

Since 1841 on several occasions the statistical activity of local authorities has been stirred by new demands of the central administration. The annual statistical tables about the movement of population have been increased to seven, besides three tables required once in 5 years and two tables required once in 10 years. These tables are as follows:

(1) A general return of the movement of the resident, or de jure, population.

(2) Emigration and immigration.

(3) A table showing the usual registration data.

(4) A table showing marriages, births, deaths, stillbirths, and miscarriages, classified by month of occurrence.

(5) Deaths classified by age.

(5a) Deaths classified by cause and by sex.

(6) Special statistics of violent deaths.

(7) Special statistics of suicides.

(These seven are required annually.)

(8) The ages of bride and groom at the time of the marriage.

(9) Special statistics of twins and of multiple births.

(9a) Causes of death classified by sex and age of the decedents.

(These three are required every five years.)

(10) Previous marital condition of brides and grooms.

(11) Marital condition of adult decedents.

(These two are required every 10 years.)

In order that the members of the congress may understand the range and variety of information contained in these statistics I have appended to this paper a copy of each table required of each commune.

Modèle n° 11.

INDEX

Nom _____

Prénoms _____

Profession _____

Lieu et date de naissance _____

Rue _____ n° _____ .

Volume _____ *Folio* _____ .

COMPOSITION DE LA FAMILLE

N° D'ORDRE. 1.	Nom et prénoms de la Femme. PRÉNOMS DES ENFANTS. 2	LIEU ET DATE DE NAISSANCE. 3	*OBSERVATIONS* 4
1			
2			
3			
4			
5			
6			

CADRE V. — Age des décédés, en 1911. (Non compris les mort-nés et autres enfants présentés sans vie.)

Décomposition de la colonne 6 du Cadre III.

Age des décédés (1)	Hommes. Légitimes.	Hommes. Illégitimes.	Femmes. Légitimes.	Femmes. Illégitimes.	Age des décédés (Suite).	Hommes.	Femmes.	Age des décédés (Suite).	Hommes.	Femmes.	Age des décédés (Suite).	Hommes.	Femmes.	Age des décédés (Fin).	Hommes.	Femmes.
Moins d'un jour, c'est-à-dire, moins de 24 heures																
De 1 à moins de 2 jours																
— 2 à » de 3 —																
— 3 à » de 4 —																
— 4 à » de 5 —																
— 5 à » de 10 —																
— 10 à » de 15 —																
— 15 à » de 20 —																
— 20 à » de 25 —																
— 25 jours à moins d'un mois																
— 1 à moins de 2 mois																
— 2 à » de 3 —																
— 3 à » de 6 —																
— 6 mois à moins de 1 an																
Total des décès de moins d'un an																
— 1 à moins de 2 ans																
— 2 à » de 3 —																
— 3 à » de 4 —																
— 4 à » de 5 —																
— 5 à » de 6 —																
— 6 à » de 7 —																
— 7 à » de 8 —																
— 8 à » de 9 —																
— 9 à » de 10 —																
A reporter																

(1) L'enfant décédé à moins d'
est celui qui a vécu au moins 48 h
au moins, mais moins de 730 jo

CADRE VI. — Statistique spéciale des morts violentes, année 1911.

Faits ou moyens.	Homicides.	Suicides.	Accidents.	Cas douteux.
Armes à feu				
Asphyxie par les gaz du charbon				
Id. par d'autres gaz				
Id. par suffocation				
Brûlures				
Chute de corps durs				
Id. d'un lieu élevé				
Convois de chemins de fer				
Éboulement de terrains ou de co				
Empoisonnement				
Foudre				
Ignition				
Instruments tranchants ou autres				
Machines industrielles				
Strangulation				
Submersion				
Voitures ou chevaux				
Autres faits ou moyens, connus ou				
Tot				

CADRE VII. — Statistique spéciale des suicides, année 1911.

(Voir Cadre VI, colonnes 3 et 4.)

A. Age des suicidés. (Voir la note au bas du Cadre V.)

	Moins de 16 ans.	16 à moins de 25 ans.	25 à moins de 40 ans.	40 à moins de 50 ans.	50 à moins de 60 ans.	60 à moins de 70 ans.	70 ans au moins.	Age inconnu.	Total.
Hommes									
Femmes									
Relevé									Chiffre égal à celui des colonnes 3 et 4 du Cadre VI (suicides).

B. État civil et profession des suicidés.

	Profession agricole.	Profession commerciale.	Profession industrielle.	Profession intellectuelle ou libérale.	Autres. (Voir la note du cadre II.)
Célibataires					
Mariés					
Veufs					
Divorcés					
État civil inconnu					
Relevé					Chiffre égal à celui des colonnes 3 et 4 du Cadre VI (suicides).

Bruxelles. — Imprimerie A. LESIGNE, rue de la Charité, 27.

CADRE VIII. — Ages respectifs des époux au moment du mariage.

(Développement de la colonne 1 du Cadre III.)

AGE DE L'HOMME. (Voir la note au bas du Cadre III.)	AGE DE LA FEMME. (Voir la note au bas du Cadre III.)												TOTAL — HOMMES.
	Moins de 18 ans.	18 à moins de 21 ans.	21 à moins de 25 ans.	25 à moins de 30 ans.	30 à moins de 35 ans.	35 à moins de 40 ans.	40 à moins de 45 ans.	45 à moins de 50 ans.	50 à moins de 60 ans.	60 à moins de 70 ans.	70 à moins de 80 ans.	80 ans au moins.	
Moins de 21 ans													
21 à													
25 à													
30 à													
35 à													
40 à													
45 à													
50 à													
60 à													
70 à													
80 an													

(1) No

CADRE IX. — Statistique spéciale des accouchements multiples et des jumeaux.

Le nombre des jumeaux renseigné dans ce Cadre a été déjà compris, au Cadre III, dans le nombre des naissances et dans celui des mort-nés ou autres enfants présentes sans vie.

N. B. Les nombres à consigner dans ce tableau sont ceux des accouchements et non ceux des enfants nés vivants (1) ou mort-nés.	A. NOMBRE DES *ACCOUCHEMENTS DOUBLES*									
	DE DEUX GARÇONS.			DE DEUX FILLES.			D'UN GARÇON ET D'UNE FILLE			
	tous deux nés vivants. (1)	tous deux mort-nés ou présentés sans vie.	1 né vivant (1), 1 [illegible] ou [illegible] sa[illegible]	toutes deux	toutes deux	1 née vivante (1).	tous deux	tous deux	le garçon	la fille
Légitimes										
Illégitimes										
Total des accouchements doubles. .										

(1) Nés vivants, c'est-à dire compris dans la statistique des naissances.

B. NOMBRE DES *JUMEAUX* ISSUS D'ACCOUCHEMENTS DOU[illegible] (Renseignements puisés ci dessus litt. A.)		Garçons.	Filles.	
Nés vivants.	Légitimes. . .			
	Illégitimes . .			
Mort-nés ou présentés sans vie.	Légitimes. . .			
	Illégitimes . .			
Total. . .				

CADRE X. — État civil des mariés.

(Décomposition du total de la colonne 2 du Cadre III.)

NOMBRE DES MARIAGES ENTRE											
	Garçons et filles	— et veuves	— et divorcées	Veufs et filles	— et veuves	— et divorcées	Divorcés et filles	— et veuves	— et divorcées	Nombre total des mariages.	

CADRE XI. — ÉTAT CIVIL DES DÉCÉDÉS EN AGE DE MARIAGE.

(Développement du Cadre V, à partir des décès de personnes âgées de 15 ans.

AGE DES DÉCÉDÉS (*Voir* la note au bas du Cadre V).	Célibataires		Mariés		Veufs		Divorcés		État civil INCONNU		TOTAL (1)	
	hommes.	femmes.	hommes.	femmes.	hommes.	femmes.	hommes.	femmes.	hommes.	femmes.	hommes.	femmes.
15 à moins de 18 ans												
18 à » de 21 —												
21 à » de 25 —												
25 à » de 30 —												
30 à » de 35 —												
35 à » de 40 —												
40 à » de 45 —												
45 à » de 50 —												
50 à » de 55 —												
55 à » de 60 —												
60 à » de 65 —												
65 à » de 70 —												
70 à » de 75 —												
75 à » de 80 —												
80 à » de 85 —												
85 à » de 90 —												
90 à » de 95 —												
95 à » de 100 —												
100 ans au moins.												

(1) Les nombres inscrits aux différentes lignes de cette colonne sont la reproduction de nombres déjà consignés au Cadre V.

Vu et vérifié les totaux et leur concordance :

A , *le* 1911.

Le Gouverneur ou *le Commissaire d'arrondissement,*

Bruxelles. — Imprimerie A. LESIGNE, rue de la Charité, 91.

MODÈLE No 2.

Nº D'ORDRE DU REGISTRE DES SORTIES .....

COMMUNE D..... PROVINCE D.....

CERTIFICAT DE CHANGEMENT DE RÉSIDENCE

à remettre au déclarant qui doit le présenter dans la quinzaine à l'Administration communale de sa nouvelle résidence, sous peine d'amende.

L'Officier de l'état civil de la commune d..... certifie que ce jour..... 190 la personne soussignée a déclaré {vouloir établir / avoir établi (*)} sa résidence dans la commune d..... province d..... avec son ménage composé, elle comprise, des personnes ci-après désignées, inscrites au registre de population, vol. ....., fol. ....., rue ....., nº .....

(*) Biffer celle des deux formules qui n'est pas applicable.

Numéro.	Nom de famille.	Prénoms.	Lieu de naissance Province Commune	Date de naissance (voir note 1)	Lien de parenté avec le chef de ménage ou position dans le ménage.	État civil (voir note 2)	Nationalité belge ou étrangère	Professions, Fonctions ou Positions. (voir note 3)	Domicile légal. (voir note 4)	Seconde résidence et indication de la commune où l'intéressé a déclaré avoir sa résidence principale.	Observations.
1	2	3	4	5	6	7	8	9	10	11	12

NOTES : (1) Mentionner la date exacte de naissance (jour, mois, année). — (2) Mentionner le lieu et la date du mariage, divorce, décès du conjoint, légitimation, reconnaissance, adoption, etc. — (3) Mêmes mentions qu'à la colonne 6 du registre, modèle nº 1. — (4) Indiquer, le cas échéant, le nom et, si possible, l'adresse du tuteur.

Signature ou marque du déclarant, Sceau Communal L'Officier de l'état civil (ou son délégué),

MODÈLE No 4.

Nº D'ORDRE DU REGISTRE DES SORTIES .....

COMMUNE D..... PROVINCE D.....

AVIS DE CHANGEMENT DE RÉSIDENCE

à adresser immédiatement, par la Poste, à l'Administration communale de la nouvelle résidence qui doit provoquer, pour faire l'inscription au registre, la remise du certificat Nº 2.

L'Officier de l'état civil de la commune d..... donne avis que ce jour..... 190 , la personne soussignée nous a déclaré {vouloir établir / avoir établi (*)} sa résidence dans la commune d..... province d....., rue ....., nº....., avec son ménage composé, elle comprise, des ..... personnes ci-après désignées, inscrites à notre registre de population, vol. ....., folio ....., rue ....., nº .....

(*) Biffer celle des deux formules qui n'est pas applicable.

Numéro.	Nom de famille.	Prénoms.	Lieu de naissance Province Commune	Date de naissance (voir note 1)	Lien de parenté avec le chef de ménage ou position dans le ménage.	État civil (voir note 2)	Nationalité belge ou étrangère	Professions, Fonctions ou Positions. (voir note 3)	Domicile légal. (voir note 4)	Seconde résidence et indication de la commune où l'intéressé a déclaré avoir sa résidence principale.	Observations.
1	2	3	4	5	6	7	8	9	10	11	12

NOTES : (1) Mentionner la date exacte de naissance (jour, mois, année). — (2) Mentionner le lieu et la date du mariage, divorce, décès du conjoint, légitimation, reconnaissance, adoption, etc. — (3) Mêmes mentions qu'à la colonne 6 du registre, modèle nº 1. — (4) Indiquer, le cas échéant, le nom et, si possible, l'adresse du tuteur.

Signature ou marque du déclarant, Sceau Communal L'Officier de l'état civil (ou son délégué),

N. B. — Le présent certificat doit toujours être accompagné : 1° D'un extrait du casier judiciaire ou d'une déclaration négative; 2° Pour toute personne en âge de faire partie de la garde civique, du bulletin renseignant la situation de cette personne, au point de vue du service de la garde [arrêté royal du 8 août 1900].

All these tables are prepared annually in every Belgian city or commune. Several large cities have gone much further, amplifying certain tables so as to include demographic and sanitary details which appear to them of special interest.

It should be understood that we are dealing only with registration statistics. Many large and middle-sized cities publish statistics regarding the finances, the schools, or the sanitary condition of their commune. Such topics I have disregarded in this report.

Among the demographic statistics maintained by the localities outside of the returns required of every commune the following may be especially mentioned:

Brussels and Liege tabulate their deaths according to the occupation and the position in it. Brussels tabulates the causes of death according to the occupation and the position in it. It also distributes the deaths to three social classes, the rich, well to do, and poor, and ascertains the distribution of causes of death among these three classes. These special statistics are found in the annual report published by the section on demography and hygiene in Brussels, and included in the one presented to the communal council by the corporation of the burgomaster and sheriffs.

The Antwerp bureau of hygiene publishes an annual report on demographic statistics, in which the births, marriages, and deaths are shown by streets and quarters; the causes of death by quarters, by months, by social condition, and by sex; and the causes of death resulting from diseases of different classes, classified by occupation and sex.

We find also in the monthly bulletin of Antwerp statistics a statement of the movement of travelers through the Antwerp stations, of the number of tickets sold and the number collected on the internal or international service, the weight of the baggage, the number of tickets sold to workmen and others at reduced rates, and finally the number of emigrants through Antwerp.

These demographic returns from the communes are derived from the population registers and the registers of civil condition. The latter are found in all civilized countries where registration of births, deaths, and marriages is required. It is not so with the population registers, which exist in only a small number of European countries. It will be interesting to say a few words about them, if only to give the members of this congress an idea of their form and of their uses for demography. In Belgium a population register is kept in each commune. It is a list of all persons residing regularly in the commune, giving for each the full name, time and place of birth, marital condition, legal abode, occupation and position in the industry, and nationality. The register contains also columns to indicate the date of enrollment and of departure of each inhabitant and ultimately the date of his acquiring a second residence. It gives certain data regarding the militia, the civil guard, and the judicial docket. Finally it contains a list of the successive residences of each inhabitant of the commune and a list of the households that have succeeded each other in a certain dwelling.

Who are to be included on this register?

Every person habitually living in the commune, whether a Belgian or a foreigner, a major or a minor, present or temporarily absent.

Persons who live in different communes at different seasons are inscribed on the registers of each but counted only in the total population of that locality which they designate as their principal residence. In order to make the maintenance of these registers certain, the law requires the administrative officers to compile them in accordance with the household bulletins obtained at the general census of population and requires certain declarations from the citizens. Everyone, Belgian or foreigner, who takes up his habitual residence in any commune must go to the town house to enroll himself on the population register and supply the requisite information. If he previously lived in any other Belgian commune he must submit the certificate given to him by the officers of that place. In the case of a foreigner who has just taken settlement in the country a passport or some other means of identification takes the place of this certificate. Anyone who wants to change his residence either to another commune or another country must declare his intention to the communal officer before he departs. He is then given a certificate of change of residence. Within a fortnight after his declaration he must produce it before the officer of the commune to which he has moved. On so doing he is enrolled in the population register of that commune.

Anyone in the commune who changes his place of residence within it must make a declaration at the town house within eight days. Such declarations of residence and of abode are made by the head of the house for all persons in the household, including laborers and servants.

Whenever an inhabitant comes into a commune, stays there, or goes out, this fact gives rise to a certain number of entries which are made on the principal register, the register of arrivals, the register of departures, the alphabetical index of inhabitants and the enrollment card which is given back to every head of a household. This results in a complex play of enrollments, the details of which I think it unnecessary to describe, but which can be understood by examining the documents appended to this communication.

These documents, in addition to the reproduction of a model population register, include a model of a card index and of the certificates (No. 2) and of the permission (No. 4) which are required for changes of residence.

These registers make it possible to determine each year the population of each commune. This figure is entered in the first table of the annual statistics. It is obtained as follows: Suppose one wishes to fix the population for December 31, 1911. On one side are put all the arrivals; that is to say, all persons born in or migrating into the commune in 1911. On the other side are entered

the departures; that is to say, all persons who died or who emigrated from the commune during that year. These various elements, which include what is called the annual movement of population, are derived from the population registers.

If the arrivals exceed the departures, the excess is added to the census population of 1910. On the other hand, if the departures exceed the arrivals, the excess is subtracted. In this way the population of December 31, 1911, is found.

We proceed in the same way to get the population for December 31, 1912, but with the difference that the excess of arrivals over departures or vice versa is added to or deducted from the figure for December 31, 1911, found by the method just explained. In order to get the figure of a population on December 31 of any year between two censuses we follow the same procedure, starting each time with the figure established for December 31 of the year preceding.

The arrivals and the departures just mentioned constitute the immigrations and emigrations of each commune. The register of population then affords the means for constructing these interesting statistics which furnishes the local administration with data regarding the migratory movement in the locality. Even though the figures thus reached are not absolutely exact they permit us to follow closely enough the imperceptible movements resulting from changes of residence within a country and to measure the incessant fluctuations of the population, especially of great cities.

THE PRESENT POSITION OF MUNICIPAL VITAL STATISTICS IN THE UNITED STATES.

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A brief account of the present status of municipal vital statistics in the United States involves unusual difficulties, since practically every city has a system of its own, and the annual reports vary quite frequently even in essential matters of detail, from year to year. This conclusion applies as much to the largest as to the smallest city, but a critical discussion of defects and shortcomings in matters of detail would require a more extended consideration than is practicable on the present occasion. The establishment of a division of vital statistics in the permanent census office in 1900 has in this respect proven a hindrance rather than a help in the development of municipal vital statistics and the proper method of their presentation in the form of annual reports. In gratifying contrast, however, there has been a measurable advance in the accuracy and uni-

formity of the original data and the fundamental requirements for trustworthy vital statistics with special reference to the use of standard death certificates and standardized method of classification of causes of death, etc., and for this far-reaching and important result the nation is under lasting obligations to Dr. Cressy L. Wilbur, in charge of the division referred to.

NEEDLESS DELAY IN PUBLICATION.

At the outset it may be said that one of the chief defects of American municipal reports on vital statistics is the paucity of the data. The annual reports vary widely in intrinsic merit and many are practically worthless for the important purposes which the data are intended to serve. There is an unwarranted amount of needless delay in the publication of the required information, and for illustration, the health report of the city of New York for 1910 has not yet been published, whereas the report for 1909 did not become available to the public at large until early in 1912. For the city of Chicago no report was published for the years 1907–1909, but a consolidated report for the four-year period, including 1910, was published in 1911; this report, in many respects, is one of the most interesting and instructive of its kind ever published for an American community, but such a report should be issued promptly during the first six months of every year, for the preceding 12 months, so that the facts may be available in a convenient form at the time when they are likely to prove most useful for public needs.

ABSENCE OF UNIFORMITY.

The absence of uniformity in the annual presentation of the vital facts, and the crude and superficial analysis having reference thereto, is one of the most lamentable defects in the American public-health administration of to-day. In the case of the city of New York the size of the reports during the last decade has varied from less than 200 pages to over 1,200 pages, with apparently no regard for the inherent principle in all administration that the public records for any given department require to be made accessible to the public at large in the most convenient form and at the earliest possible date. The best illustration of intelligent conformity to the principle of continuity is to be found in the admirable reports on the vital statistics of Providence. R. I., and of the District of Columbia. For 55 years the reports for the city of Providence have been uniform in size and almost identical in the presentation and analysis of the facts, except in so far as modern methods of tabulation, classification, and analysis have replaced the crude and less scientific methods of an earlier date. The city of Providence and the State of Rhode Island

are indebted to Dr. Edwin M. Snow for the enduring foundations laid over half a century ago in the organization of a properly equipped department of vital statistics, and the work of Dr. Snow has been carried forward with signal ability and admirable devotion by Dr. Charles V. Chapin, the present city registrar and the author of a well-known treatise on sanitary science.

The reports for the city of Washington, or more accurately, the District of Columbia, are of unusual completeness with special reference to the mortality of the white and colored populations. Subject to criticism in matters of detail, the annual reports on the vital statistics of Providence and Washington may safely be considered models of their kind for the municipalities of the United States.

NEED OF ADEQUATE PRESENTATION OF VITAL FACTS.

For the purposes of demography it of course is an essential requirement that the vital facts shall be made public in sufficient detail to furnish the required answers to the many questions which arise in public-health administration, with special reference to the practical needs of preventive medicine. There is a lamentable indifference to this necessity in most of the annual reports of American boards of health, and there are no indications of a decided improvement, but rather the reverse. It is of the highest importance that public-health officials should recognize the need of adequate presentation of vital facts, and the equally imperative necessity for qualified critical analysis. Superficial observations on the basis of the crude death rate may seriously mislead the public at large and bring about a condition of apathy where eternal vigilance is the essential of success. Perhaps in no direction is this better illustrated than in the almost universal neglect of mortality analysis by divisional periods of life. One of the most important exceptions to this rule is the comparison of death rates by age and sex, for the city of New York, in the report for 1909, in which the facts are presented in the form of a decennial review for the last 30 years. On account of the importance of the data the facts are given in tabular form below:

Mortality rate of New York City by divisional periods of life.

Ages.	Males.			Females.		
	1880–1889	1890–1899	1900–1909	1880–1889	1890–1899	1900–1909
Under 5 years	109.12	87.75	60.54	94.67	75.98	52.24
5 to 14 years	7.29	5.38	4.25	6.92	5.26	3.96
15 to 24 years	9.00	7.60	6.32	7.51	6.07	5.00
25 to 44 years	17.36	15.34	13.92	14.55	12.08	10.23
45 to 64 years	35.89	34.96	35.51	27.96	27.45	26.37
65 years and over	110.93	104.41	103.95	100.47	98.66	93.96
All ages	29.17	25.05	20.93	24.57	21.10	17.05

PRACTICAL UTILITY OF VITAL STATISTICS.

According to this table, the mortality of males, ages 25 to 44, has decreased only 9 per cent, when the 10-year period ending with 1909 is compared with the 10-year period ending with 1899. Since from an economic point of view, and as an industrial problem, the mortality of the male population, ages 25 to 44, is of the highest importance, it is obvious that the aim of public-health administration, with special reference to preventable diseases, is not being realized. In fact, at ages 45 to 64 there has been an actual increase of 1.5 per cent in the mortality rate of males during the decade ending with 1909. This illustration is sufficient to emphasize the practical utility of death rates by divisional periods of life, but with the exception of the report referred to, no such analysis is made for any other American city although the facts are neither difficult to obtain nor are the required calculations more than a matter of simple arithmetic. The population, by ages, for 1910, can be had through the Census Office, and if there has been delay in publication it is largely because there has not been the proper public demand for the facts.

IMPORTANCE OF THE ELEMENT OF RACE.

Next to the questions of age and sex, the most important factor in American mortality statistics, at least for southern cities, is the element of race. The only report in which the facts are presented with the required degree of accuracy and in sufficient detail—that is, by causes and divisional periods of life—is published by the board of health of the city of New Orleans, but unfortunately at biennial intervals, so that the data for 1910 will not be available until sometime during 1912. The analysis of the data for New Orleans, however, is quite insufficient and no attempt is made in the annual reports to provide a basis for an accurate comparison of the mortality rates of the white and colored races by causes and divisional periods of life. Considering that there are strong reasons for believing that the mortality of white males in the city of New Orleans at ages 45 and over is decidedly excessive when comparison is made with the corresponding mortality for northern or western cities, it is obviously of the utmost importance from a practical point of view that more attention should be given to the required critical analysis of the vital facts. A similar conclusion applies to the city of Baltimore, which has published admirable reports for many years in a fairly uniform manner, but which fails to give the mortality by race and causes, with a due regard to divisional periods of life, although the facts for a southern city would be most important in essential matters of public-health administration.

USELESS TABULATIONS.

The practice is almost universal with American cities to publish the details of mortality by causes and ages for each month of the year. Such a tabulation is generally useless and in all probability the result of the fact that the deaths are compiled monthly and published in the form of a monthly bulletin. The fundamental elements of vital statistics—that is, age and sex—are disregarded for the secondary factor of season, which becomes of importance only in the case of a comparatively small group of causes. For southern cities, however, the race factor is of equal importance with the factors of age and sex, and to disregard the same in the tabulation and analysis of vital statistics by causes is to deprive the returns of their greatest value.

DEATHS IN PUBLIC INSTITUTIONS.

Deaths in public institutions are rarely redistributed according to the place of residence, although for some of the most important sanitary purposes it is absolutely essential that the true death rates for sanitary districts should be determined in the manner as this was done by Dr. John S. Billings in the special reports on the vital statistics of New York and Brooklyn, Washington and Baltimore, and Philadelphia and Boston, supplementary to the mortality volumes of the Eleventh Census. For sanitary purposes the wards of American cities are frequently entirely too large, and sanitary districts should be laid out, and for these the population can be ascertained with at least approximate accuracy by means of a local census. For the city of New York investigations were made by the Federal census to disclose the population by blocks, and this method should be made uniform for all of the larger cities, so that the true incidence of the death rate may be precisely established. This, however, is impossible as long as the present method of not redistributing deaths in institutions by residence of the deceased continues, with the result that most of the ward death rates are absolutely fallacious.

MORTALITY BY OCCUPATION.

Practically without exception, the health reports of American cities contain no reference to the mortality by occupation and with a due regard to causes of death by divisional periods of life. It is true, of course, that the calculation of death rates for industries or occupations involves many technical difficulties which it is frequently impossible to overcome, but in place thereof the proportionate method of mortality is an entirely feasible and for practical purposes thoroughly trustworthy one. The best illustration of the utility of this method is an analysis of the mortality of copper miners in the city of

Butte, Mont., according to which the proportionate mortality from tuberculosis at ages 15 to 24 was 11 per cent; at ages 25 to 34, 21 per cent; at ages 35 to 44, 35 per cent; and at ages 45 and over, 31 per cent. As emphasizing the incidence of tuberculosis of the lungs in the mortality of men engaged in a well-defined occupation, the proportionate method of analysis is not only sufficient for practical purposes, but from the point of view of preventive medicine much more conclusive than death rates calculated on the basis of the number employed.

INFANTILE MORTALITY.

The mortality during the first two years of life is seldom shown by months, and for the first four weeks of life, by days. For the purpose of a conclusive inquiry into the problem of infant mortality, the death rate, or at least the proportion of deaths, requires to be known for shorter intervals than as brought out by the customary method of presenting the facts for the first year of life, and from the second to the fifth, inclusive. The Berlin data in this respect are probably the most useful, and as far as practicable the deaths of infants should be shown separately according to the method of feeding—that is, whether natural, artificial, or natural and artificial combined.

MORTALITY FROM CANCER.

With regard to certain diseases, particularly cancer, there is much neglect to give the facts in full detail so as to show the organ affected, with a due regard to sex and conjugal condition. The most useful data on cancer mortality, arranged with reference to race, sex, marital relation, age, and organ or part of body involved, are given in the annual reports of the health officer of the District of Columbia. In view of the increasing importance of cancer, the subject requires much more intelligent consideration than it has received heretofore, and with special reference to the critical analysis of the available statistical material. The mortality from cancer should be given by locality, and deaths in institutions should be redistributed so that the true local incidence of the disease may be determined. The possible existence of cancer houses should be made the subject of a separate study in much the same manner as this has been done in the case of tuberculosis. The probable relation of cancer to topography and occupation requires to be made the subject of special research, with a reasonable promise of most interesting results on the basis of the findings of Mr. C. E. Green, of Edinburgh.[1]

MORTALITY BY SINGLE YEARS OF LIFE.

The mortality by single years of life is not published for any one of the larger American cities, but in the case of a few small cities a full statement is printed, giving the details of each death by age, sex, cause, etc. Such data can be utilized to exceptional advantage in the study of the true incidence of disease, for there are strong reasons for believing that the death rate does not increase progressively from a minimum point at the beginning of adolescence. The mortality statistics of the census for recent years have been made to include a table of deaths by single years, which, for certain practical purposes, is a most useful addition to knowledge. In the study of local health problems the deaths by single years often serve a better purpose than by divisional periods of life, and as far as practicable the reports of large municipalities should include a table showing the deaths by single years of life, with distinction of sex at least, and if possible, with distinction of the principal causes.

GRAPHIC ILLUSTRATIONS.

There is not much to be said with regard to the graphic presentation of vital facts, for as a rule the work is neither scientifically nor artistically as well done as would be desirable if the one sole object of graphic presentation—that is, the vizualizing of essential facts—is to be achieved. The earlier practice of coordinating the mortality by months or weeks to weather conditions has been almost entirely done away with, although the practical utility of such charts, if intelligently constructed, can not be questioned, particularly in the case of the mortality of children under 5 years of age.

As illustrations of defective methods of graphic presentation reference may be made to the report of the Board of Health of Milwaukee, Wis., for 1910. Some excellent graphics appear in the report of the Boston Board of Health, particularly a chart exhibiting the decline in the proportionate mortality of children under 5 years of age and in the mortality from principal causes for the period 1851–1910. The reports of the Board of Health of Philadelphia contain some fairly satisfactory graphics of the relation of infant mortality to weather conditions and a rather suggestive chart in colors showing the changes in the relative position of the number of deaths from fifteen selected diseases for the period 1903–1910. The use of spot maps has been discontinued in the case of some of the reports, which formerly emphasized the local incidence of disease, and this is specially true of the reports of the District of Columbia, which in years past gave much attention to this method of graphic presentation of vital facts. Mention requires to be made of the diagrams in the consolidated report of the Department of Health of the City of Chicago, prepared

under the direction of Dr. W. A. Evans, and which includes a retrospect of the mortality for the period 1871–1910, by single years, as well as with convenient averages for decades. In the Chicago report the causes of death are exhibited in a similar manner as in the annual report of the Board of Health of Philadelphia, except that the deaths are by decades from 1860 to 1909 and that colors are not used, but instead thereof a fairly satisfactory method of shading has been adopted for the preventable diseases, most of which, it is shown, have retained their respective positions of preeminence throughout the 60 years under review with the exception of typhoid fever, diphtheria, scarlet fever, and smallpox.

BIRTHS, STILLBIRTHS, AND MARRIAGES.

Stillbirths and marriages receive rather indifferent attention in most of the health reports of American cities, and as yet, for most of the cities, the birth records are decidedly defective, and no accurate birth rates can therefore be computed. Increasing attention is being given to this subject, however, and the outlook is encouraging, more so in view of the active interest of the Division of Vital Statistics of the Census Office in this important matter. The relative fecundity of the native and foreign born is not ascertainable for more than a very small group of American cities, and the most useful facts are ascertained through census inquiries, and particularly so in the case of Rhode Island. Facts regarding multiple births and stillbirths are of considerable medical and even legal interest, aside from their value in the study of biosociological problems. Stillbirths are not reported with anything like the required degree of accuracy, especially during the later periods of utero-gestation. There are strong reasons, however, for believing that abortions are increasing, and the same conclusion applies to the frequency of miscarriages brought on by artificial and illegal means.

The statistics of marriages are very imperfectly considered in the reports of American municipalities, although the elements of statistical inquiry have been thoroughly well understood for many years. The ages at marriage of grooms and brides and the remarriage of widows and widowers, with a due regard to age, are matters of considerable interest and importance. Intermarriages, that is of different races, nativities or religious confessions, are probably more common than generally assumed, but with the exception of a few cities the data are not given in the annual reports of municipal departments of health.

MATERNITY STATISTICS.

No maternity statistics are published, although it would serve a most useful purpose if the facts were shown as to the number of children had, the number of children living, the ages of the mothers,

etc. As recently brought out by Lucien March, there are some reasons for believing that the later-born children are subject to a higher death rate than first-born children, and while the facts may be only of biosociological interest, they may possibly, in course of time, be made to serve a larger and more practical end, particularly in connection with the increasing attention that is being given to the whole subject of applied eugenics.

MONTHLY REPORTS.

For quite a number of American cities monthly reports on vital statistics are published, but they unfortunately vary so much in matters of detail and tabular arrangement that it is practically impossible to coordinate the facts for one city with those of another, with a due regard to the mortality by sex, age, and principal causes. The Weekly Sanitary Abstracts as published by the Public Health and Marine-Hospital Service are quite useful for general purposes, except that the returns are frequently incomplete and only a relatively small number of causes are reported. It should not be a difficult matter to improve the Weekly Sanitary Abstracts in the tabular arrangement of the facts, and by insisting on prompt returns for all of the cities included a useful account of the current death rate could be secured. At present the data are frequently for different periods of time, and they are not summarized in a convenient form.

PUBLIC IMPORTANCE OF VITAL FACTS.

In view, however, of the fact that the Public Health and Marine-Hospital Service can not compel the local registrars to make prompt returns, the outlook is not encouraging that much of an improvement will be obtained in this direction. Unfortunately, in the case of a number of cities, the registrars are indifferent to the larger public uses of vital statistics, and they consider their duties fully discharged by the proper recording of vital facts and a crude tabulation at the end of the year. It requires to be understood that vital facts are public property and that the importance of the same is not limited to the locality in which they become a matter of record. For legal, medical, and sociological purposes the registration of vital statistics is to-day an imperative necessity, and adequate provision should be made on the part of all the cities for accurate and complete registration, tabulation, and analysis. To take a bookkeeper's point of view of so important a matter as the health and life of a community is merely evidence of a backward condition which can only be remedied by the higher education of public-health officials and a clearer recognition of their important public functions, not only to the community but to the nation at large.

NECESSITY FOR CRITICAL ANALYSIS.

The tendency to-day is to shift the responsibility for the publication of vital statistics upon the Census Office, and inquiries with regard to local vital facts are quite frequently referred to Washington instead of being answered through the local registrar. It is of the utmost importance, however, that the vital statistics of any given community should be critically interpreted by some one qualified to do so in the locality, and no one is in a better position to do so than the local registrar. Intensive studies of mortality require to be made by persons living in the locality and thoroughly familiar with all the facts which require to be taken into account. This duty can not properly be shifted upon the Division of Vital Statistics of the Census, nor, as is sometimes suggested, upon the proposed national bureau of health.

THE BUDAPEST SYSTEM OF DEATH CLASSIFICATION.

As yet no American city has adopted the Budapest system of multiform death classification. The utility of that system is so obvious that it requires no discussion. Many of the most important causes of death, particularly diseases of the heart, liver, and the urinary system, are seriously complicated by other causes which require to be better known than is at present the case. The additional amount of time and labor necessary for the supplementary tabulation and analysis is not a matter of serious consideration or expense.

ANNUAL REPORTS ON ENGLISH VITAL STATISTICS.

American municipal reports on vital statistics are in marked contrast to the uniform series of admirably prepared reports for the large cities and for many of the counties and minor civil subdivisions of England and Scotland. No city in the United States gives publicity to its vital facts in the manner and to the extent that this is done, for illustration, in the annual report on the public health of the London county council, which makes a document of about 200 folio pages, including a large number of interesting and instructive charts and comparative vital statistics for many years. We have also nothing in this country which conforms to the report annually published on the health of Blackburn, a city with less than 150,000 population. The report of Dr. Greenwood consists of a document of over 300 pages, including some excellent maps and instructive tables regarding the mortality of cotton workers by causes and divisional periods of life. In addition thereto there is annually published in behalf of the county borough of Blackburn a report of the school medical officer, which makes a document of nearly 200

pages, including exceedingly suggestive anthropometric statistics of school children according to schools, ages, etc.

In this connection mention may be made of the report published annually on the medical inspection of school children by the county borough of Rochdale, including numerous tables, diagrams, nutrition figures, anthropometric statistics, etc. The report for the borough of Cambridge is a document of about 150 pages, including spot maps exhibiting the occurrence of infectious diseases, and diagrams emphasizing the salient facts of health and mortality during the year. The report of the medical officer of health of the county of Lancaster is a document of nearly 300 pages, including an extremely interesting map exhibiting the infantile mortality, by urban and rural districts, for the year 1910, and the decade ending with 1909. This report may be referred to as an almost ideal presentation of vital facts for an intensely industrial section of England, but one in which the death rate has steadily decreased during the last 20 years. The reports of Dr. Fremantle, of Hertfordshire, are most suggestive, with particular reference to the discussion of the more important preventable diseases, amplified by a special report on the health of school children, including a discussion of physical records and an outline of urgent sanitary defects. The same favorable conclusions apply to the health reports of Manchester, Liverpool, Bradford, Leicestershire, Leeds, Nottingham, and many others, each of which is practically a treatise on public health and an elementary textbook on vital statistics. It is not going too far to say that to a not inconsiderable degree the marvelous sanitary progress of England during the last 50 years has been the result of the admirable method of public accounting for the vital facts and sanitary defects as disclosed by an intelligent consideration of the subject and an intelligent presentation of the sanitary experience from year to year. It may further be said that it is largely on this account that England has retained its preeminent position in public-health administration, and that the degree of doctor of public health (D. P. H.) is not an empty title but the equivalent of preeminence in professional work.

PRESENT STATUS OF AMERICAN VITAL STATISTICS.

At the present time the report of not a single American municipality on vital statistics and sanitary administration can be referred to as a model for adoption by other cities, large and small, with a due regard to adaptation to local requirements. The best reports are those for Providence and the District of Columbia as regards the presentation of vital facts in a uniform manner and with due attention to essential matters of detail. In not a single case do our American reports at the present time approach the corresponding reports for

large English cities, counties, or even minor civil subdivisions. The reports do not reflect adequately the sanitary progress which has been achieved, nor do they, as a rule, show precisely the decline in the mortality from preventable diseases which has actually taken place. It would serve no useful purpose to praise where none is deserved, but it requires to be said that American registrars work under the serious disadvantage of a general public indifference to an adequate presentation and critical analysis of the vital facts of the municipalities in which they live. As far as it is possible to judge, there is a more serious public interest in local vital statistics abroad than there is in this country. To a certain extent this is to be accounted for by the general crude and indefinite manner in which the facts are presented for public consideration. The ideal reports on vital statistics are for foreign and not for American cities. Probably the most adequate presentation of vital facts is for the city of Budapest, where, under the admirable administration of the late Dr. Körösy, an excellent plan had been developed, which is being carried on in a uniform manner, and with a due regard to local conditions, particularly the large variety of races and peoples, as well as religious beliefs, by his successor, Dr. Thirring. It is to Körösy and Thirring that we owe the Budapest system of death classification, the adoption of which by American cities can not be too highly recommended as a prerequisite in the development of practical vital statistics as a branch of municipal sanitary administration.

The foregoing brief discussion has been limited to some of the more pressing needs of American municipal vital statistics at the present time. There is most urgent need for a clear recognition of defects in existing methods as well as the almost limitless opportunities for the practical utility of vital facts, which at present are largely ignored and even treated with contempt. There are praiseworthy exceptions to the general rule, but it requires to be said that most of the reports on the vital statistics of American municipalities are far from meeting public requirements and are far from conforming to realized ideals in foreign countries.

CONCLUSIONS.

The foregoing observations and conclusions are briefly summarized as follows:

1. The publication of the annual vital statistics of American municipalities is, as a rule, too much delayed and the reports are not available at the time when they would be of most public interest and value. The reports should be published as promptly as possible during the first six months of the year following the one to which they refer.

2. The reports, as a rule, vary so much in essential matters of detail from year to year that they fail to afford an adequate basis for an

intelligent study of local mortality in its relation to sanitary efficiency as reflected in the death rates from all causes and specified causes by divisional periods of life. The English plan of uniform annual reports should be followed and a series of standard tables should be adopted, after the manner of the tables required by the local government board. Such tables for American municipal vital statistics should be approved by the chief of the Division of Vital Statistics of the Census Office, so that there may be exact conformity in the Federal and municipal returns.

3. The mortality by age and sex, with a due regard to the living population at corresponding ages, is almost entirely ignored in the annual reports of American boards of health. The information as regards the population by ages can be obtained from the Census Office and for a number of States at five-year intervals through local census inquiries. The true changes in the death rate can only be measured by means of death rates calculated for divisional periods of life and with a due regard to sex, race, and the principal causes of death.

4. The race factor requires to be taken into full account, at least in all of the reports for southern cities, and for northern cities with a relatively large colored population. The feasibility of presenting the facts with reasonable fullness and a due regard to the requirement referred to is best illustrated in the annual reports on the city of New Orleans and the District of Columbia.

5. The crude death rate for many cities is calculated upon erroneous principles, but particularly as to the assumed increase in population, which is often only a matter of pure guesswork. The method of the Census Office in estimating the population for the intercensal years should, as far as practicable, be followed, since the office takes into account every trustworthy method by which a correct estimate of a population may be arrived at.

6. The rules of statistical practice as approved by the American Public Health Association and the Division of Vital Statistics of the Census Office should prevail as far as practicable to bring about the required uniformity in the tabular presentation of the facts. The method still prevails, particularly in the case of many of the smaller cities, to tabulate the deaths in alphabetical order, or according to the judgment of the registrar, in place of exact conformity to the international list of causes of death, which is the result of mature and experienced judgment which may safely be trusted in a matter of this kind. This conclusion also has reference to the statistical treatment of joint causes of death, as to which accuracy and uniformity is obviously of the utmost importance.

7. The Budapest system of death classification is not at the present time made use of by a single American municipality, although the intrinsic merits of this method are so self-evident that they require

no discussion. Particularly is this true with reference to the more scientific study of the mortality from diseases of the heart, liver, and urinary organs, since the deaths from these diseases are almost invariably complicated by others of more or less equal medical or general scientific importance.

8. Most of the health reports of American cities fail to give sufficient consideration to the mortality statistics of previous years. Every report of this kind should include at least a decennial review of the principal causes of death, and the resulting death rates should be calculated upon the best available basis of information as to the probable population for intercensal periods.

9. For comparative purposes most of the health reports of American cities are of very limited utility at the present time, and as shown by Dr. Jacobs, the specific returns with regard to deaths from a particular cause may vary for the same community quite considerably, according to whether the information is derived from the report of the local board of health or of the State board of health or of the Division of Vital Statistics of the Census. To a considerable extent these variations are the result of crude methods of statistical practice, particularly with reference to the proper treatment of joint causes of death. The increasing economic and social importance of preventable mortality emphasizes the imperative necessity of accuracy and uniformity, since serious errors may result from the blind acceptance of official, but nevertheless untrustworthy, statistical returns.

10. The mortality from specific causes does not receive the adequate and qualified critical consideration which is essential for the ascertainment of underlying causes of public ill-health due to conditions more or less subject to social control. The admirable statistical treatment of cancer in the annual reports of the District of Columbia emphasizes precisely the methods which should be followed with regard to this and many other diseases or causes of death of practical importance to the public at large.

11. Infantile mortality statistics are as a rule limited to a statement of deaths by single years of life under five. The data should be given in detail for the first four weeks of life and subsequently by months to the end of the second year, and thereafter by single years to the end of the fifth year. The distinction should be made, for the first four weeks at least, as to legitimacy and illegitimacy and whether the child was breast fed or nourished by artificial means.

12. The important subject of occupational mortality is practically ignored in the health reports of American municipalities, although few subjects have attracted more general attention during recent years than industrial hygiene. The admirable method employed in the reports of the boards of health of Blackburn and Sheffield, Eng-

land, should be followed; but for American municipalities the proportionate mortality would probably serve a better purpose, at least, as regards the requirements of preventive medicine than the calculation of more or less untrustworthy occupational death rates by divisional periods of life. The proportionate method has been adopted for occupational mortality statistics by the Division of Vital Statistics of the Census in the preliminary reports on the mortality in 1908 and 1909.

13. Deaths in public institutions are not, as a rule, redistributed according to the residence of the deceased, and as a result the ward death rates are more or less untrustworthy and frequently seriously misleading. The practicability of redistributing such deaths without much difficulty has been emphasized in the reports of Dr. Billings on the vital statistics of New York, Brooklyn, and other lagre cities, in connection with the census of 1890. It requires no argument to prove that for an intensive study of mortality and disease frequency the redistribution of deaths in institutions, according to the residence of the deceased, is absolutely essential, and in this connection it may be said that, as a rule, the wards of American cities are entirely too large for intensive sanitary studies, and should be divided into sanitary districts, and, as far as practicable, with a due regard to topographic features.

14. No health reports of large American cities give the mortality by single years of life, although for many purposes such a return would be extremely useful. The Census Office has adopted this method in recent reports, and the tabulation of the data, with a due regard at least to sex, and possibly the principal causes of death, would not present serious statistical difficulties.

15. The graphic illustrations, or charts and diagrams, in American health reports are, as a rule, extremely crude, and from an artistic point of view more of a hindrance than a help to the visualizing of the vital facts of the community to which they refer. Some of the best graphic illustrations are given in the reports of the boards of health of Boston and Chicago, but no American board of health approaches in this respect the great majority of the large cities of England and most of the other civilized countries of the world. Since the use of graphics is indispensable in the education of the public in public health matters, it is essential that much more intelligent consideration should be given to this subject than heretofore has been the case. The construction of diagrams and charts is as much a matter of conformity to well-established principles as the construction of tables and their required analysis.

16. Monthly reports are quite generally issued for American cities, and in a few cases the reports are issued weekly, with a considerable

amount of detail. For the larger cities it would be advisable to give the weekly mortality by days, since particularly in the study of deaths in their relation to meteorological conditions the exact time factor is of real importance. Overemphasis is frequently given to meteorological statistics, which, if required, can be obtained without difficulty from the local or national weather bureau, and it would therefore seem advisable to use the available space for a more complete return of deaths by principal causes and divisional periods of life.

17. The whole subject of morbidity statistics never has received much qualified consideration, but an admirable account of the local requirements regarding the reporting of contagious and infectious diseases has been recently published by the Public Health and Marine-Hospital Service. Apparently the best method of presenting the statistics of diseases of sanitary importance is the one used for many years by the superintendent of health of the city of Providence, R. I., in his annual report, which is supplementary to the report on vital statistics. There are probably no other vital facts which more conclusively demonstrate the efficiency of the local health service than the actual and relative decline, not only in the mortality but also in the morbidity from diseases due to preventable causes, and in this respect the report of the city of Providence is unquestionably the most conclusive document of its kind published for an American municipality at the present time.

18. Statistics of births and stillbirths for American cities are all more or less untrustworthy with the exception of a small number, where local ordinances regarding the reporting of births are rigidly enforced. The praiseworthy effort of the Census Office to bring about a radical improvement in this respect, and to provide for the American people a trustworthy basis of fact as regards fecundity, useful for local or international comparison, is deserving of every possible encouragement. In view of the ever-increasing practical importance of eugenics, the data as to births and stillbirths are to-day of recognized national and even international importance. Statistics of this kind should differentiate legitimate from illegitimate births, and, as far as practicable, stillbirths should be given according to the month of utero-gestation. There is also much urgency for the more accurate reporting of abortions, and the returns should differentiate criminal abortions from those due to natural causes.

19. The statistics of marriage and maternity of many cities are not reported with a reasonable attention to matters of detail. Statistics of this kind should show the ages at marriage for both bride and groom, as well as the ages of the contracting parties remarrying and whether single, widowed, or divorced. Statistics of this kind also have a practical bearing upon the problem of eugenics, and reference may be made to the admirable maternity statistics published

at decennial intervals in connection with the census of the State of Rhode Island. Information of this kind should be available for the nation at large, but with a due regard to sex, age, race, nativity, and the number of children had by the mother, differentiating, however, those living or dead at the time of the enumeration.

20. There is an unfortunate tendency on the part of American registrars to shift the responsibility for information as to matters of detail to the Census Office at Washington. Vital statistics are public property, and their importance is not limited to the locality for which they are a matter of record. In its final analysis, the effective solution of local health problems can result only from a thorough study and understanding of the local facts. Registrars of vital statistics hold an exceedingly important position, and for the fulfillment of their responsible duties they are entitled to more ample compensation than is paid in the case of a majority of American cities at the present time. There is, unfortunately, a disposition to view the function of city registrar merely as that of a bookkeeper instead of the custodian of records of the highest possible legal, medical, and social importance. The increasing attention which is being given to problems of preventive medicine makes it essential that these records should be made more accessible to the students of the subject and the seeker after truth. The tendency to shift the responsibility from the locality to the Federal capital, either in the matter of furnishing information to those in need thereof or to do away with the publication of vital statistics in sufficient detail and subjected to a critical analysis, is likely to materially hinder the cause of local sanitary progress, effective local sanitary administration, and qualified statistical research.

21. It is a matter of regret that not a single health report of an American city can be referred to as a suitable model for general acceptance throughout the country at large. None of the four larger cities—that is, New York, Chicago, Philadelphia, and Boston—publishes reports which conform in essentials to the admirable reports on the sanitary administration of the county of London, or for most of the large cities of England, Scotland, and for many of the British dominions and protectorates throughout the world. A more comprehensive and conclusive report is published annually on the vital statistics of the island of Ceylon than for any American city at the present time, and some of the smaller English counties publish more comprehensive and useful reports with regard to mortality, sickness, and sanitary administration than are published for any one of the larger cities of the United States. It is also a matter of record that the efforts of the American Public Health Association to bring order out of chaos and to produce a more satisfactory result thus far have

been practically futile. The efforts of the Royal Sanitary Institute in this respect have been much more satisfactory, and to a not inconsiderable extent this result must be attributed to the recognition of the higher professional status of the public health officials as emphasized in the degree of doctor of public health. At the present time the annual reports of the medical officer of health of the London county council (Sir Shirley Murphy), supplemented by the annual reports of the medical officer of education (Dr. James Kerr), are the models which suggest themselves to the most earnest seeker after truth and ideals in the health administration of American cities.[2]

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[1] See also in this connection "Preventable Cancer," a statistical research by Rollo Russell, Longmans, Green & Co., London.

[2] For a more extended discussion of practical suggestions for improving vital statistics, see my address on this subject published in the Quarterly Publications of the American Statistical Association, Dec., 1907. Boston, Mass.

DISCUSSION.

Dr. William H. Guilfoy, registrar of records department of health, city of New York.—I congratulate Dr. Würzburger on his admirable presentation of the subject in question in so far as it relates to the German Empire. The Germans do all things thoroughly, and the reports of some of the German cities could very well serve as models for similar reports on the part of the large cities of this country. The statistical yearbook, such as edited and published by the German cities, is one that could be patterned after by the cities of our own country, especially if the various departments in the city government would publish, in addition thereto, detailed reports showing the work done and the results attained. The exception that I make as to a particular portion of the reports of some of the German cities is the difficulty I have had in trying to make comparisons between the death rates of certain infectious diseases, such as tuberculosis, in New York and Berlin. I find that the imperial classification is very thorough and specific, but the causes of death as accepted by the local authorities need investigation. In the report of the city of Berlin there are to be found such indefinite causes of death, with hundreds of deaths assigned thereto, as "lungenkrankheit," "lungenblutsturz;" causes such as these are not accepted in New York as sufficiently definite. I hope the day is not far distant when the International Classification will prevail in Germany just as it prevails in the other large civilized countries of the world.

This country of ours is a new nation, not yet awakened to the necessity of possessing accurate statistics as to life and health, though of late years the Bureau of the Census has performed wonders in this direction. Twenty years ago the number of cities issuing annual reports was few, principally the large cities, such as Chicago, Philadelphia, Boston, Providence, and New Orleans. The immense majority issued no reports. To-day the number has increased con-

siderably, and though much criticism may be indulged in as to the quality of the tables printed therein, still the seed is planted and, with time and cultivation, the product will be more worthy of the name of a report on vital statistics. One thing that has struck me has been the awakening of some of the cities of the South and many of the West; the International Classification is used by the majority of them, and, on the other hand, some of our eastern cities and even some of our large ones in New York State insist upon using an alphabetic classification, or one based upon the health official's own conception of what a classification should be.

A feature of some of the reports issued by some of the western cities is the exploitation of the city's death rate with the end in view of attracting home seekers to take up their abode therein, claiming that the low death rate of 8 or 10 per 1,000 from all causes proclaims the city as one of the healthiest in the land. A more pleasing feature is the incorporation in the weekly, monthly, and yearly reports of timely articles on the various phases of public-health work and containing instructions, sometimes startling recom..endations for the preservation of health. The rat, squirrel, fly, mosquito are held up therein for public scorn and private extermination; every condition of the city affecting its health is dwelt on. One of our large western cities uses the International Classification, for which it may be commended; but on the next page, it advertises an automobile race and a parade of the Grand Army of the Republic. A report that I received from one city did not contain the name of the city; according to this report it had a board of health, made 100 bacteriological examinations and 70 chemical examinations in one month, and printed a list of individual milk sellers, but gave no clue as to the name of the city or its situation.

The criticisms of Mr. Hoffman, although rather severe, are warranted; but the criticisms of the reports issued by the New York City Board of Health have got under my skin. I am speaking now from the standpoint of a public official and I think I simply reecho the complaints of local health officers and registrars throughout the land when I seek refuge in the statement that sufficient money is not apportioned to this branch of the work in order that it may be carried on thoroughly. I admit, for instance, that Mr. Hoffman's statement that the 1910 and 1911 reports of the department of health have not yet been published, but I insist upon having it put on record that the analyses of the mortality of the year 1910 and the statistical tables accompanying it were ready for the printer on the first of April, 1911; and it has been true for a great many years that the statistical reports are ready within three months after the completion of the year. Some day it may be possible for the department of health to print its own reports, and when such day arrives

we may not be criticised for the delay in the issuance thereof. The city of Berlin employs, in addition to the director of the statistical office and several trained statisticians, 43 clerks, and the city of Buffalo, I understand, gives its registrar one clerk to aid him in issuing weekly, quarterly, and yearly reports, so that the question sometimes revolves around the amount of money spent in the preparation of the material at hand.

THE WORLD-WIDE EFFORT TO DIMINISH INFANT MORTALITY—ITS PRESENT STATUS AND ITS POSSIBILITIES.

EDWARD BUNNELL PHELPS, Editor, The American Underwriter, New York City.

Thoughtful people throughout the civilized world are at last awakening to a realization of the intimate and inseparable relation of infant mortality with human welfare and progress, and, thus awakened, are beginning to sense the grave importance of checking the present appalling waste of infant life. Varying only in detail and relative importance, the problem confronts all inhabited lands; and obviously its dimensions are world wide.

A world problem though it is, up to very recent years the workers in this field naturally have concentrated the bulk of their attention on the facts and figures of their respective countries, municipalities, or districts, according as their endeavors on these lines were national or purely local in scope. A few demographers have made use of all available official statistics and from time to time tabulated international comparisons of birth rates and infant death rates. But, in so far as I have observed, up to date no one has made any serious attempt to measure infant mortality as a world-wide problem and thus supply even the merest approximation of the probable number and rate of infant deaths in the world at large. In default of such information, even though almost one-half of the world's population as yet makes practically no pretense of compiling its vital statistics, it may not come amiss at the outset of this inquiry regarding "The world-wide effort to diminish infant mortality," to venture into this unexplored field, apply to its several sections such adjusted estimates as the known figures for fairly comparable sections would seem to warrant, and thus endeavor to work out a tentative approximation of the present status of infant mortality as a world problem. With such an approximation available, we shall have at least a prefatory glimpse of the magnitude of the problem which confronts us.

AN APPROXIMATION OF THE INFANT MORTALITY OF THE WORLD AT LARGE.

There is, of course, a wealth of international statistical compilations available as a basis for such a computation, but the current issue (No. 5) of the Official Year Book of the Commonwealth of

Australia, that remarkable work of G. H. Knibbs, the Commonwealth statistician, bearing date of June 25, 1912, presents figures for the world's population in the main compiled from the Statesman's Year-Book for 1911, and offers the very latest reliable international vital statistics now available. Mr. Knibbs fixes the world's total population at 1,722,322,136, and, making allowance for the natural increase since the figures presented in Sundbärg's Aperçus Statistiques Internationaux (1908 edition) and Webb's New Dictionary of Statistics were compiled, the total presented in the Official Year Book of the Commonwealth of Australia bears every evidence of approximate accuracy. Making his estimate on the basis of the figures in the editions of the République Française; Annuaires statistiques for 1905–1907, Webb puts the world's population at 1,610,000,000, and Sundbärg in 1908 made it 1,647,533,770.

Mr. Knibbs's estimate being the latest available and apparently entitled to full credence, I have taken his figures as the basis for the following tabulation of populations, in even millions, and from the latest birth and infant death rates which his work and the Statesman's Year-Book for 1912 present I have worked out the appended figures for the several sections, with the exception of those for India and China. My figures for India are based on the official Report on Sanitary Measures in India in 1909–10 (Vol. XLIII), published in 1911, and those for China on certain specific figures presented in Prof. Edward Alsworth Ross's very recent work, The Changing Chinese (1912), as checked up and modified in the light of various other credible sources of Chinese information which I have consulted and the official vital statistics for the near-by city of Manila for the last nine years. Thus computed, the number and rate of births and infant deaths now annually occurring in the world at large and their broad geographical distribution would seem to be approximately as follows:

Sections of the world.	Population.	Living births.		Deaths under 1 year.	
		Rate per 1,000 of population.	Number.	Rate per 1,000 births.	Number.
Russia in Europe (and its European possessions)	136,000,000	48	6,528,000	250	1,632,000
Balance of Europe	312,000,000	29	9,048,000	140	1,266,720
Australasia and Polynesia	7,000,000	26	182,000	70	12,740
India	315,000,000	36	11,340,000	240	2,721,600
China (and its dependencies)	434,000,000	50	21,700,000	400	8,680,000
Balance of Asia	209,000,000	35	7,315,000	200	1,463,000
Africa	133,000,000	35	4,655,000	200	931,000
America (all parts)	176,000,000	30	5,280,000	150	792,000
Total	1,722,000,000	38	66,048,000	265	17,499,060

The above population estimates are probably entirely dependable, with the possible exception of that for China and its dependencies, the population of China having been stated in the returns of the second National Census published by the Chinese Government on February 27, 1911, as 310,168,305, as contrasted with the estimate of 407,253,030 for China proper given in the Statesman's Year-Book for 1912. There are other reasons for believing that the supposed population of China, generally fixed at approximately 400,000,000, may have been decidedly overestimated, but even were a deduction of a round 100,000,000 from the world's supposed total population made on this account the annual totals of living births and infant deaths would still stand at 61,048,000 and 15,499,060, respectively, and the world's average birth rate and infant death rate at 37.6 and 254, respectively, as compared with the averages of 38 and 265, shown by the preceding tabulation.

On the strength of his personal observations and inquiries Prof. Ross fixes the Chinese birth rate at from 50 to 60 per 1,000 of population, on page 110 of his work previously named referring to "the present fecundity of 50 to 60 per 1,000—three times that of the American stock and nowhere matched in the white man's world, unless it be in certain districts in Russia and certain parishes in French Canada." He also says (p. 103):

> Dr. McCartney, of Chungking, after 20 years of practice there, estimates that 75 to 85 per cent of the children born in that region die before the end of the second year. The returns from Hongkong for 1909 show that the number of children dying under 1 year of age is 87 per cent of the number of births reported within the year. The first census of the Japanese in Formosa seems to show that nearly half of the children born to the Chinese there die within six months.

In the London Lancet and other publications I have found confirmation of these figures for the Chinese population in Hongkong and Formosa. By tabulating the official vital statistics of the Philippine capital for the last nine years (1903–1911) I find that the apparent infant mortality rate in Manila (and presumably, officials say, in the Philippines at large) was 552 per 1,000 births—and as high as 477 for the last five years despite the improved registration of births—and even the incomplete birth returns show a birth rate of 41.4 per 1,000 population for Manila in 1910. It would therefore seem, in view of all the direct evidence regarding China and the collateral official evidence concerning near-by Formosa and Manila, that the assumption of a birth rate of 50 and an infant death rate of 400 per 1,000 births for China is well within conservative limits and very probably below the actual figures in each case.

In the case of India, both the birth and infant death rate figures which I have employed are below the actual registration figures for about three-quarters of the total estimated population of India, the

mean birth rate for the last quinquennial period having been 38.64, and the infant death rate for 1909 having been, on the average for both sexes, 243.6 per 1,000 births, whereas I have fixed these figures at only 36 and 240, respectively. For the remainder of Asia, and for Africa as a whole, I have assumed an average birth rate of 35 per 1,000, and an infant death rate of but 200, and for North, South, and Central America average rates of only 30 and 150; and I venture to believe that anyone provided with even the most superficial information regarding the vital statistics of these sections will concede that all of these assumptions are extremely conservative. It would consequently seem entirely safe to say that, in round numbers, at least 60,000,000 births annually occur in the world at large, and that the world's infant mortality each year amounts to 15,000,000 at the lowest possible estimate. In other words, presumably more than 40,000 babies' deaths occur each day in the year, practically one for every other second of time. Or, to put it graphically, one infant dies every other time the clock ticks. Including the heavy colored-infant mortality of the South, the United States probably contributes almost if not quite 1,000 of the world's total of 40,000 infant deaths per diem, and there are the best of reasons for believing that 50 per cent of the world's 40,000 infant deaths a day, year in and year out, are unquestionably preventable. In brief, the needless annual waste now foots up at least 7,500,000 infant lives.

THE FIRST STATUTORY MOVES FOR ITS REDUCTION.

In one sense special protection for helpless infancy is as old as civilization—and in the broadest sense as old as the human race—but deliberately planned and broadly executed governmental measures for preventing the appalling, needless, waste of infant life, which has only latterly been demonstrated, are practically restricted to the present generation, and in the main are but events of yesterday. To be sure, the spasmodic public discussion of the luckless lot of babies "put out to nurse" at least dates back to the production of Dickens's Oliver Twist, in 1830, or more than 80 years ago. But, as Miss Frances Zanetti, an inspector at Manchester, England, noted at the recent Third International Congress for Infant Protection, at Berlin, in her contribution to the discussion of foster children and illegitimate children, the first infant-life protection act of Great Britain did not become the law of the land until 1872. As Miss Zanetti put it:

> The movement for the protection of children nursed for hire probably owes its inception to Charles Dickens, whose powerful novel, Oliver Twist, with its graphic descriptions of the sufferings of the unfortunate "juvenile offenders under the poor laws, farmed out at the rate of 7½ d. per small head per week," brought vividly home to his readers all the trials and injustices inflicted upon these children by those misnamed

"guardians of the poor," who failed so lamentably in their trust. Yet, though it is said that a wave of horror swept over England when Oliver Twist was published, and though undoubtedly the book struck the death blow to "Bumbledom," the plea for the better protection of children nursed for hire bore no result for more than 40 years.

Although the famous Loi Roussel, of France, was not enacted until 1874, or two years after the English infant-life protection act, as early as 1835 Brodart, at Tours, urgently called for the regulation of the "nursing industry." In 1862 the summary of an investigation published by the minister of the interior revealed an infant mortality of 73.43 per 100 births in nine departments. Four years later, Dr. Brochart published a paper, awarded a prize by the Academy of Sciences, in which he showed that, without including those assisted, 100,000 babies died in France each year of hunger, misery, and the lack of the necessary care and attention. In 1867 the Academy of Medicine appointed an infancy commission, in 1869 instituted a mixed commission under the presidency of M. de Royer, president of the Cours des Comptes, and on April 12, 1870, made the Commission on the Hygiene of Infancy a permanent one. The war, of course, temporarily interrupted the academy's work on these lines, but on November 28, 1871, the commission presented its preliminary report in which it discussed the causes of infant mortality and means of combating them; in 1873 was allotted 2,000 francs by the minister of the interior for the purchase of medals for the principal essayists who had contributed to the extensive discussion of the subject, the publication of their papers, etc.; and, finally, in 1874 the measure introduced in 1873 by Dr. Théophile Roussel, the well-known deputy, was enacted, and was promulgated on January 8, 1875. Such was the evolution of the famous statute, which, in recognition of the service rendered by its author, was designated the "Loi Roussel."

Like the English infant-life protection act of two years before, the French law was powerless except in the case of infants farmed out, but within the limitations of that field was much more comprehensive and effective. The infant-life protection act was not the final outcome of a prolonged medical and governmental, or semigovernmental, investigation of infant mortality and its causes, as was the French law, but was the immediate result of the wave of horror which swept over England at the discovery that the deaths of a number of infants whose bodies were found in the streets of London were due to a woman named Margaret Waters, who was arrested, tried, convicted, and hung for her wholesale crime. A select committee was promptly appointed "to inquire as to the best means of preventing the destruction of the lives of infants put out to nurse for hire by their parents," and the crude law adopted in 1872 was thus born, applying only to infants under 1 year of age and prohibiting the maintenance of more than one such child for more than 24 hours away from its

parents except in a house registered for the purpose. The French law, on the other hand, was operative in the case of all children under 2 years of age who might be put out to nurse or cared for, made them the special care of the State, and contained elaborate provisions for the registration, inspection, and supervision of all places in which children under 2 years of age might be so kept. The English law was of slightly earlier date, but the Loi Roussel was practically the pioneer in its line, and doubtless served as the model for most of the legislation on these lines subsequently adopted in other countries.

FRANCE THE PIONEER IN THE MOVEMENT.

Not only in legislation but in various other steps for infant welfare, France is conceded by common consent to have blazed the way for the present, almost world-wide, crusade for the reduction of infant mortality. It was in France that the Société de Charité Maternelle was founded in 1786, even prior to the Revolution, by Madame de Fougeret, for the relief of poor married women at the time of confinement, and in 1910 was credited with having aided about 30,000 mothers. At Paris, too, the "Association des Mères de Famille" was established as early as 1836, has as many sections as there are arrondissements, and with a liberal hand deals out varied forms of aid and relief to indigent mothers. The day-nursery movement, which now reaches out to practically every corner of the civilized world, was founded, with probably never a thought of its ultimate evolution, by M. Firmin Marbeau, when he established the pioneer crèche at Paris on November 14, 1844. In 1893, Dr. Variot, one of the pioneers in the child-welfare movement, started a "Distribution de Lait au Dispensaire de Belleville" in Paris, thus paving the way for the first "Gouette de Lait" opened under that name in 1894 by Dr. Dufour of Fécamp; that present adjunct of babies' milk stations, the "Consultation de Nourrissons" made its advent in 1892 at the Charité Hospital, and later on developed at the Maternité and the Clinique Tarnier, in Paris, and is accredited to that great leader in the battle against infant mortality, Dr. Pierre Budin. At the "Pouponniéres," indigent mothers are received without charge on their discharge from the hospitals after convalescing from their confinement, on the single condition that they will nurse their own babies, and, in each case, the baby of some other mother whose employment makes it impossible for her to nurse her own; and these institutions also date back about 20 years, the original "Pouponniéres" at Porchefontaine, near Versailles, having been created by the "Société Maternelle Parisienne" under the direction of Pasteur and Dr. Bergeron.

A great variety of other institutions for the care of pregnant women, women in confinement, and needy mothers with newly-born

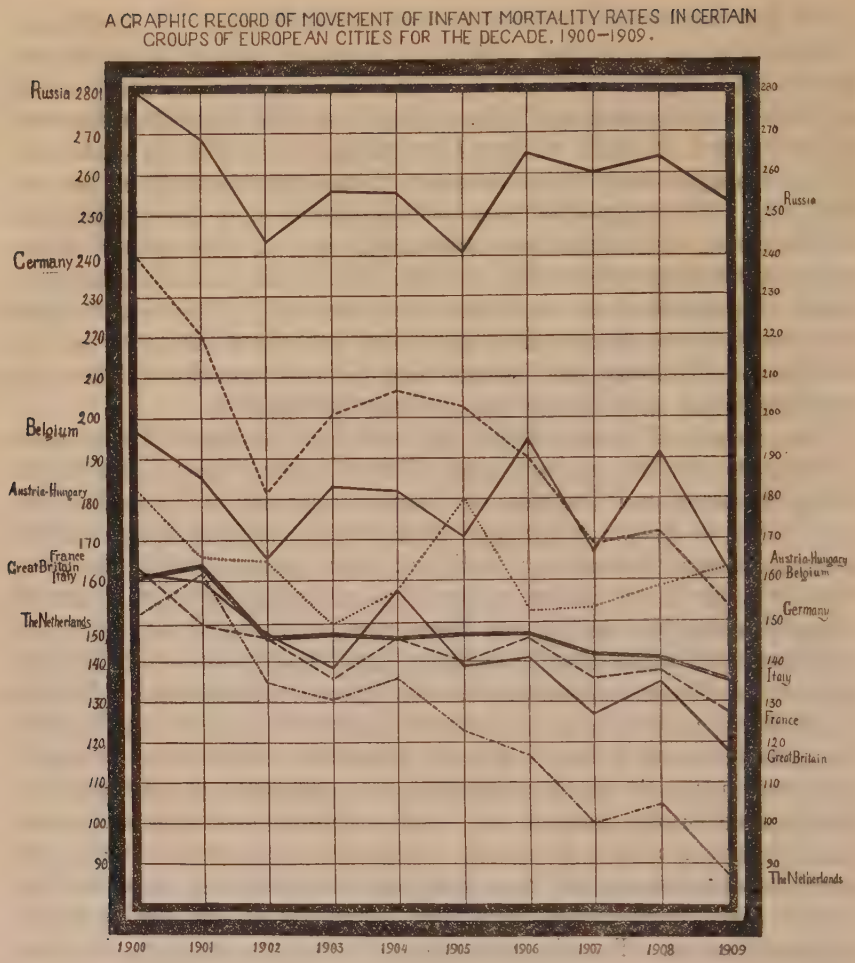
charges, have been established in Paris in the last half century or so, and the first great national organization for the protection of infant life came into being in the French capital in 1902, when the "Ligue Française contre la Mortalité Infantile" was established by that illustrious trio of child-welfare pioneers, M. Roussel, the father of the Loi Roussel, Dr. Budin, and Senator Paul Strauss. The "Ligue Nationale Belge pour la Protection de l'Enfance du Premier Âge" was founded at Brussels in the following year, and in 1905 at the suggestion of Drs. Variot and Dufour the First International Congres de Gouttes des Lait was convened at Paris. At the second congress, held at Brussels in September, 1907, it was decided to broaden the scope of the international organization by changing its name to the "Congrés pour la Protection de l'Enfance du premier Âge," with its original title, "Gouttes de Lait," preserved in parenthesis, by way of permanent acknowledgement of the movement's indebtedness to the leadership of France, and in 1911 the third Congress convened at Berlin.

A notable feature of the Third International Congress for the Protection of Infant Life was the preparation and presentation to the delegates of an impressive résumé of the general plan and details of the child-welfare movement in greater Berlin under the direction of the management of the Kaiserin Auguste Victoria House for the Combating of Infant Mortality in the German Empire, the headquarters of the work on these lines in the Empire which is described at some length on subsequent pages of this paper. In addition to the descriptive matter, and directions for visiting the child-welfare institutions of Berlin, the souvenir work in question also contained an admirable review of the Development and Organization of the Movement for the Protection of Infants, prepared by Geheime Obermedizinalrat Professor Dr. Dietrich, of the Imperial Home Office and president of the International Association for the Protection of Infant Life, on which the writer of this paper has freely drawn for much of the detail of the preceding summary of the movement. The contents of the souvenir volume were printed in three languages for the convenience of the delegates from German, French, and English speaking countries, and the work constituted a book of 460 pages, effectively illustrated and bound. In his introductory paragraph, Dr. Dietrich thus authoritatively acknowledges the debt which the infant-welfare movement owes to France:

> From time immemorial efforts have been made among cultivated nations to introduce special welfare work for children during their first year of age. But these efforts were without system and were only isolated. The first important attempts at systematic welfare work for babies took place toward the end of the last century in France where the great decrease in births and the decrease in the surplus of births over deaths had for a long time caused national biologists great anxiety.

At the session of the First International Congress of Gouttes de Lait at Paris, in October, 1905, Dr. Eugène Lust, of Brussels, suggested the organization of an international union "which would establish a permanent and international point of connection between all interested in child welfare throughout the world, so as to perpetuate progressively the institution of the Congresses of the Gouttes de Lait." The suggestion was heartily approved by the congress, an organization committee was appointed, and at the Second International Congress of Gouttes de Lait, held at Brussels in September, 1907, the constitution and rules recommended by the organization committee were adopted and the Union Internationale pour la Protection de l'Enfance du Premier Âge (The International Union for the Protection of Infancy) was formally established.

The mayor of Huddersfield, England, the chairman of the health committee of Glasgow, and other British visitors had attended the First International Congress of Gouttes de Lait, at Paris, in 1905, and were so deeply impressed with the movement that on their return, at their instance, a National Conference on Infant Mortality was held at Westminster, under the patronage of their Majesties King Edward VII and Queen Alexandra, on June 13–14, 1906, and presided over by the Right Hon. John Burns, M. P., president of the local government board, and a permanent organization effected. In 1908 the Dutch National League was founded, in 1909 the German Union for the Protection of Infants, and the American Association for Study and Prevention of Infant Mortality were organized in Germany and the United States, respectively; and in Spain, Switzerland, Luxemburg, Italy, Norway, Denmark, Bulgaria, Roumania, Russia, and possibly other countries from which returns have not been received, international committees have been organized or are now in course of organization. The Governments of Germany, Belgium, Norway, Holland, Bulgaria, Australia, and Uruguay have already voted, or promised, annual subsidies for the international union, and the movement for the reduction of infant mortality may therefore be said to have become firmly established on an international basis. This brief summary of the origin, and review on broad national and international lines, of the movement would seem to justify the breadth of the title of this paper, and it is now in order to record as compactly as possible the results of the endeavor to ascertain on authoritative, first-hand information from the officials of the various leading countries and sections the present status of the movement in their several jurisdictions, and to trace in so far as possible the actual results of the movement up to date.



THE MOVEMENT IN VARIOUS COUNTRIES—GERMANY.

With a view to securing the desired data, a uniform letter of inquiry was addressed, several months since, to the chiefs of the principal statistical bureaus of all the more important countries or sections of Europe, Australasia, Japan, Canada, and South America. A similar inquiry was addressed to the registration officials of all the registration States and the 50 leading registration cities of this country, but owing to the unfortunate shortcomings of the vital statistics of most sections of this country, not only was the form of the inquiry necessarily altered, but the results of the investigation in the case of the United States are scarcely comparable with those secured from many of the foreign countries. Succinctly summarized, the inquiries addressed to the statistical bureaus called for informa-

tion as to (1) statutory action directly or indirectly bearing on infant mortality, (2) official bureaus, if any, created to care for child hygiene or the maintenance of milk stations, and (3) organized private efforts for the reduction of infant mortality. With the exception of Italy, Portugal, Scotland, Denmark, and Switzerland, replies were received from all European countries to which inquiries were addressed, and also from Japan, but it is perhaps needless to say, replies widely differing in character and value. Unfortunately, no returns have been received from South America, and none of value from any of the Provinces of Canada, with the single exception of Nova Scotia, but all possible data have kindly been supplied by the commonwealth statistician of Australia and the statistician of New Zealand, and in the majority of cases the European returns have been surprisingly complete and comprehensive. Without the hearty cooperation of the many officials in question the preparation of the paper would practically have been impossible.

To those personally acquainted with the scholarly and scientific work and methods of my German confréres it would be entirely needless for me to remark that in scope and volume the returns received from the officials of the German Empire and many of its States and cities were almost amazing. In fact, the correspondence and printed matter received from Germany undoubtedly exceed, by a comfortable margin, the entire output of all other countries and sections in response to my request for information. I have no thought of raising international questions at a gathering so essentially international in character as is this congress, but common fairness and a sense of deep obligation to the statistical officials of the German Empire who have so cordially cooperated in the preparation of this paper compel me to make this frank, blanket acknowledgment. The officials of many other countries have done all that could have been expected of them in the way of cooperation, but both in amount and scope of its data Germany has unquestionably led as pronouncedly as it leads up to date in the systematization and thoroughness of its campaign for the reduction of infant mortality. France blazed the way, but Germany has perfected and lighted the road to the desired goal.

I regret that the limitations of this paper make it impossible for me to include in it a hundredth part of the detailed information as to the child-welfare work in the various States and leading cities of the German Empire which I have received in response to my inquiry. At most I can undertake only to present an outline sketch of the movement in the several countries and sections, but the German system, as now perfected, of centralizing and intelligently shaping the movement for the reduction of infant mortality is so admirably

adapted for the great work in hand, and is replete with so many suggestions of value for similar movements in any large country, that any adequate treatment of it would demand a paper entirely devoted to that subject.

Dr. Fritz Rott, one of the medical directors and departmental chiefs of the Kaiserin Auguste Victoria-Haus, the impressive headquarters, at Charlottenburg, of the infant-welfare movement in Germany, has favored me with a most comprehensive review of the German movement in its entirety, and did space permit, the reproduction of his communication would present a clear picture of the great campaign which Germany has mapped out for herself. In the opening sentence of his letter Dr. Rott specifically states that "measures to reduce infant mortality in the German Empire on a large scale were not introduced until within the last decade. During the two preceding decades great attention was given to combating contagious diseases and to the social betterment of the working classes, so that the dangers of infant mortality have not been sufficiently brought to the attention of the people at large." The general trend of his letter, and the many other letters, books, and published statements received from German officials, would seem to indicate that the present-day broad, centralized movement in Germany for grappling with infant mortality is practically traceable to the earnest personal identification of Her Majesty, the Kaiserin Auguste Victoria, with the campaign. Under date of November 15, 1904, the Empress addressed a letter to the Vaterländischen Frauenverein (Patriotic Women's Society), urging the importance of all charitable societies uniting with the local authorities in promoting practical measures for the care of infants. This important stand taken by the Empress exercised immediate effect; organizations for the protection of mothers and infants were soon in course of formation in all parts of the Empire, and the foundation of the central organization, and the dedication of the great building bearing the Empress's name, on June 4, 1909, were the eventual results of her participation in the work.

It should by no means be understood that the first moves in the German campaign were those above mentioned, many States and cities having established "krippen" (the German term for crèches, or day nurseries), milk stations, consultation clinics for mothers and babies, and even gone so far as to offer money or other inducements for women to nurse their babies, long before the recent centralization and consolidation of the various local movements. As Dr. Rott puts it, it is "the idea of systematic protection to infants and centralization of such effort which dates from the beginning of this century." An educational campaign for the instruction of mothers, present

and prospective, by means of leaflets, pamphlets, and other printed matter has been extensively carried on in most sections of the Empire for several years, a notable infant-mortality exhibition was held in Berlin in 1906, and permanent museums for exploiting means of properly caring for infants, and so reducing infant mortality, have recently been established in the Kaiserin Auguste Victoria-Haus, at Charlottenburg, and at Munich.

The almost innumerable clinics, krippen, milk stations, and institutions for indigent mothers before and after confinement in Germany are regarded by the German specialists on infant mortality as but comparatively minor details of the great campaign needed to educate mothers on the care of their infants and to promote breast feeding. The Berlin statistics prepared by Breckhs, showing that only one-seventh of all the infant deaths reported were those of breast-fed babies, whereas the remaining six-sevenths were those of bottle-fed babies, made a profound impression on the German scientific mind and, as Dr. Rott states, "this furnished the best proof that the fundamental requisite in fighting infant mortality consists in emphasizing the fact that babies, especially the newly born, must be fed at the breast." The measures incidental to the educational campaign based on this conviction are not so much matters of imperial law or State requirements, but are primarily administrative measures of the various municipal authorities, and the results of the activity of the Society for General Utility and private persons. In order to secure the harmonious, systematic, working of the various organizations in the German Federal States, State central offices have been established in many of the States, including Prussia, Hesse, Bavaria, Hamburg, Saxe-Altenburg and Baden. The several State governments aid in promoting their State central offices, which are also supported in the practical accomplishment of their purposes by provincial unions, the so-called main offices for the protection of mothers and infants. The main offices aim to concentrate the efforts of the different societies in their districts, without interfering with their individual independence, and the State and other organizations are welded together in a national league called the "German Union for the Protection of Infants," which was organized in 1909 and has its headquarters at Berlin. Under its auspices three German congresses have been held since 1909, at Dresden, Munich, and Darmstadt.

The course of the union and the State central offices is planned on the lines of scientific research, which is one of the principal purposes of the Kaiserin Auguste Victoria-Haus, at Charlottenburg, the headquarters of the child-welfare movement in the German Empire. The city of Charlottenburg, a municipality but practically a suburb of Berlin, presented the land on which the great building was erected,

the Empress, in whose honor it was named, took an active interest in promoting it, and when completed and dedicated in June, 1909, it represented an outlay of 2,500,000 marks, or more than $600,000. No other nation in the world has as yet filed even approximately such convincing evidence of its deep interest in the warfare on infant mortality, and the broad plans on which the institution is run are even more convincing, the president of the board of trustees being the royal chamberlain, Dr. von Behr-Pinnow, and the purposes of the institution being thus stated:

(1) To make scientific and practical investigations of the feeding and care of infants and mothers; (2) to collect material relating to infant mortality and data on organization for the care of infants in the German Empire and other civilized countries; (3) to place the results of its own scientific and practical investigations and collection of data regarding the care of infants and mothers at the disposal of the general public, by publishing these results in instructive form and to render council and information to the Government, public and private organizations, and individuals.

At the express wish of the Empress, a school for nurses has been attached to the institution, physicians wishing to pursue special studies in the nutrition of infants have every opportunity at the institution and the various clinical stations, and there are departments with the latest facilities for confinements for both sick and healthy mothers and infants, laboratories, and every conceivable requirement of such an institution. Even stables for cows, donkeys, and goats, and washing and milking rooms are also attached. In the two years following its opening the institution had cared for 415 confinements, had accommodated 791 infants, and practically 100 per cent of all the mothers confined and under observation for at least six weeks had been able to nurse their infants. The institution covers an area of more than 4 acres, and its expenses are covered by a subsidy from the German Empire, grants from the Federal States, municipalities, societies, and the society of patrons of the institute. The fees for treatment and sustenance also amount to a considerable sum. The training of nurses and midwives, and the four school courses for mothers each year are regarded as among the most important and beneficial features of the institution.

The German Industrial Code provides that no woman may be employed in factories, workshops, etc.,within a period of eight weeks before or after confinement, her reemployment being conditioned on proof that at least six weeks have elapsed since her confinement. The imperial insurance law also makes most comprehensive provisions for the payment of confinement allowances for anywhere from four to eight weeks and subject to compulsory insurance for the services of

midwives and obstretricians. In addition to the provisions of the imperial insurance law there are benevolent organizations of large industrial establishments, private funds, various societies, and many communities which make more or less provision for needy women during confinement.

Infant dispensaries, and consultation clinics, patterned after the French "Consultations de Nourrissons," were first established in Berlin in 1905, and have now become so popular in Germany that about 200 communities and unions of communities maintain them. About 100 cities give nursing assistance or nursing premiums, generally in the form of milk or cash, to needy mothers, and some cities give nursing premiums to midwives who have proved to further the cause of breast feeding. Some idea of the extraordinary breadth of the German movement on these lines may be gained by reference to the current issue of the Statistisches Jahrbuch Deutscher Staadte (1912 edition), which devotes 15 pages to the chapter on "Wochnerinnen und Säuglingsfürsorge" (women in child bed and infant protection), and presents elaborate tabulations of just what provisions each city of 50,000 or more population makes for needy pregnant, lying-in, or working women, infants, and foster children. In about 150 cities there are baby hospitals and infant homes, and near-by some cities fresh-air homes in the woods or on the seashore for the benefit of children. Special provisions are made for illegitimate and homeless children by professional guardianship in some 100 cities, and recently special regulations have been made for exceptionally endangered children—that is to say, babies syphilitic by heredity, an institution for the care of such unfortunates having already been established. As yet there are no special laws for the regulation of the day nurseries which now exist in about 150 cities, but a movement for their supervision has been started. A rigid supervision of the milk traffic and a careful control of the keeping of live stock are exercised by the proper authorities. There is no imperial law providing for the examination of milk in Germany, but as milk is an article of food, the authorities hold that the milk traffic is subject to the imperial law regulating the traffic in food, victuals, etc.

As previously stated, exceedingly interesting replies to my inquiries were received from many of the States and leading cities of Germany, but the limitations of this paper have made it necessary to condense the individual statements in a general summary for the Empire as a whole. The communication from the Grand Duchy of Hesse shows such a remarkable campaign for the reduction of infant mortality for a State of less than 1,300,000 population that at least a brief reference to its activities on these lines seems imperative. The efforts are cen-

tralized in the grand ducal central office for the care of mothers and infants, and in every one of the communities with less than 3,000 inhabitants every physician is required to supervise the care and feeding of all the healthy babies within his practice and for this service is paid a fee by the central office. In the 55 communities having over 3,000 population medical consultation offices are already, or shortly will be, established, and the whole grand duchy is divided into 18 administrative districts, each of which forms a branch office to which a nurse is assigned and by which medical consultation bureaus are established. There are about 36,000 births annually in Hesse, and it is reported that from 10,000 to 15,000 of these infants profit by the medical consultation offices.

With this hasty summary of the child-welfare activities of the Grand Duchy of Hesse, I must conclude the imperfect outline of the complex, and yet thoroughly systematized, effort which the German Empire is now making to reduce infant mortality—not only within its own borders, but in the world at large through the widely circulated publication for the common good of its investigations, experiments, and discoveries. In the subsequent summary of the showings of the tabulation of infant mortality experience of 68 European cities for the decade 1900–1909 appended to this paper, I briefly review the gratifying experience of 30 leading German cities. And, of course, granting that by no means all of the pronounced decrease in their several infant mortalities in recent years can be properly credited to the campaign now being waged, I believe that a study of the tabulation and accompanying chart will prove at least a partial case.

THE MOVEMENT IN GREAT BRITAIN.

In 1858 the late Sir John Simon, K. C. B., F. R. S., was appointed to the newly created post of medical officer of Her Majesty's privy council, in Great Britain, in which position he served for many years, and in his "Introductory Report, addressed to the right honorable the president of the general board of health, by the medical officer of the board," under date of June, 1858, he declared that "the death rates of young children are, in my opinion, among the most important studies in sanitary science. In the first place, their tender young lives, as compared with the more hardened and acclimatized lives of the adult population, furnish a very sensitive test of sanitary circumstances; so that differences of infantine death rate are, under certain qualifications, the best proof of differences of household condition in any number of compared districts. And, secondly, those places where infants are most apt to die are necessarily the places where survivors are most apt to be sickly; and where, if they struggle through a scrofulous childhood to realize an abortive puberty, they

beget a still sicklier brood than themselves, even less capable of labor and even less susceptible of education. It can not be too distinctly recognized that a high local mortality of children must almost necessarily denote a high local prevalence of those causes which determine a degeneration of the race." (Public Health Reports, 1858, Vol I, p. 460.) In his first report to the privy council Dr. Simon also referred to the "neglect of children incidentally (but not unavoidably) arising from the employment of mothers in factories as one of our chief sanitary evils." He persuaded Dr. Greenhow to communicate to the general board of health, in form for publication by Parliament, some very valuable mortality tabulations which he had compiled from the unpublished data at the registrar general's office, and thus originated the series of "Papers relating to the sanitary state of the people of England." As an outcome of these revelations, the privy council ordered an investigation of the high mortality from diarrhea in certain large manufacturing cities, and this was followed in 1861 by another investigation "into the circumstances occasioning excessive infant mortality in Coventry, Nottingham, Blackburn, Birmingham, Wolverhampton and Abergavenny."

There is, therefore, positive evidence that the interest of the medical officers of England in the subject of infant mortality dates back at least 54 years, that interest has steadily increased to the present day, and it may be said with a certain amount of accuracy that in England the effort to diminish infant mortality practically began nearly 60 years ago. That great statistician, Dr. William Farr, who served for more than 40 years as the statistical adviser of the registrar general, and practically shaped the present English system of vital statistics, brought the subject of infant mortality before the Statistical Society (now the Royal Statistical Society) in 1865, and frequently discussed it in his contributions to the registrar general's annual reports. His successors for the last 32 years have followed his example, and for many years the tabulations and discussion of infant mortality experience have been recognized as important features of the registrar general's annual reports on births, deaths, and marriages in England and Wales.

In England, as in practically all other countries with the possible exception of France, however, the campaign against infant mortality is practically confined to the present century. In fact, it did not really assume a national character until, as a result of the attendance of certain influential British visitors at the First International Congress of Gouttes de Lait at Paris in 1905, the first National Conference on Infantile Mortality was held at Westminster, on June 13–14, 1906, and a national organization effected under that title. As early as 1899 the first English milk depot, modeled after the French Goutte de

Lait, was established at St. Helens, in Lancashire; and Liverpool, Bradford, Glasgow, Dundee, and various other municipalities had followed suit in the meantime. Here and there infants' consultations, patterned after the French Consultations de Nourrissons, had also been established in England, and many spasmodic efforts on a small scale had been made to grapple with infant mortality, but, as stated, the movement did not assume a broad, national character until the organization of the National Conference on Infantile Mortality, in 1906.

A second meeting of this organization was held at Westminster, March 23–25, 1908, at which representatives of the public-health authorities of about 150 cities, and many private organizations, were in attendance, and the president of the conference, the Right Hon. John Burns, M. P., president of the local government board, reported the passage of the children act of 1908 (consolidating the laws relating to children's protection), the notification of births act, and various other measures whose enactment was principally due to the vigorous efforts of the National Conference on Infantile Mortality. A third public meeting of the conference was held at Westminster on June 4, 1912, at which the following-named other organizations were represented: The National League for Physical Education and Improvement, the Association of Infant Consultations and Schools for Mothers, the National Health Society, the Women's National Health Society of Ireland, the Women's Imperial Health Association, and the National Society of Day Nurseries. At this meeting the president suggested the eminent desirability of coordinating the work of the various organizations concerned in the prevention of infant mortality, and the proposed organization was unanimously effected under the title of the "National Association for the Prevention of Infant Mortality and the Promotion of the Welfare of Children under School Age."

All authorities on the conditions of the English crusade against infant mortality seem to be agreed that the most important single step recently taken was the enactment of the notification of births act of 1907, which is optional with the local authorities of any borough, urban district, rural district, or county, or may be declared in force in any borough or district of England or Wales by the local government board, but has already been put in force in 320 boroughs and districts, with a population of 18,386,912 out of a total population of 36,075,269. Steps are now being taken to adopt the act in some 40 additional districts, with a population of about 1,000,000, and the act therefore now is, or shortly will be, in operation in a territory with a population of approximately 20,000,000. The importance of the act in connection with the fight against infant mortality is in its requirement that the medical officer of health of a sanitary district

receive information as to the birth of a child within 36 hours after the birth, thus making it possible for a female health visitor or other competent woman to tender personal advice to the mother in regard to rearing and feeding the child in cases in which the medical officer considers such visits desirable. Under the general registration act of 1836 and the deaths registration act of 1874 it was only required that births be registered within 42 days, and deaths within 5 days, of their occurrence, and in the parish of St. Pancras, in London, it was found that 12.74 per cent of the 6,114 births in 1904 were not registered for five weeks, 28.42 per cent for six weeks, and 34.24 per cent for seven weeks, thus so delaying the registration in 75.4 per cent of the birth cases that the advice of health visitors often came too late. Under the 1907 act the birth must be reported to the medical officer of health within 36 hours, by the father if he be a resident of the house when it occurred or by any person in attendance on the mother at the time of birth or within six hours afterwards, on a prepaid letter or post card or by delivery of a written notice to the medical officer of health. The Royal Statistical Society, of London, has recently issued a comprehensive report of its special committee "appointed to inquire into the systems adopted in different countries for the registration of births (including stillbirths) and deaths with reference to infantile mortality," and its tabulations of the results of the inquiry show that no other country in Europe compels the registration of births within three days as a minimum. The exceptional value of the new English act in the cause of combating infant mortality by means of prompt advisory visits—and the possible discovery of the need for immediate medical attendance—is obvious.

The national insurance act of 1911, which became operative on July 15, 1912, provides for the maternity payment of 30 shillings in the case of the child-bearing wife of an insured person, or to the widow when the child is posthumous, or to the mother whether married or not if she is insured under the act. It also provides that if the mother is attended by a midwife and a duly qualified medical practitioner is summoned, in pursuance of the rules made under the midwives act of 1902 (requiring that the midwife shall call in a registered medical practitioner if she observes certain conditions involving danger to the mother or child), the prescribed fee shall be recoverable as part of the maternity benefit. It has been estimated that more than 4,000,000 women come within the operation of the health insurance act of 1911, and in that event a very considerable percentage of the working women of the United Kingdom over the age of 16 years will have the aid of a maternity allowance of at least 30 shillings for each confinement under the new law.

There are various other British statutes which directly or indirectly apply to infant mortality, such as the midwives act of 1902, the

factory and workshop act of 1901 prohibiting the employment in any factory or workshop, by the occupier knowingly, of a woman or girl within four weeks after she has given birth to a child, and the children act of 1908 which regulates the farming out of children under 7 years of age, and includes various other provisions for safeguarding children. There are also various statutes for the regulation of the milk traffic, inspection of cows, etc.

In 1907 the St. Pancras School for Mothers was started in the parish of St. Pancras, London, to supplement the work and cooperate with the municipal authority in the fight against infant mortality. It was the pioneer institution of its kind in Great Britain, was supported by voluntary contributors, and has so extended its work as to embrace the whole period from the expectancy of the mother to the compulsory school age of the child, and by association and cooperation with the day nursery and the nursery school has become "a comprehensive school of mothercraft and babe training," as its founder, Dr. John F. Sykes, D. Sc., M. O. H., has termed it. It bases its work against infant mortality on the discouragement of hand feeding and the encouragement of breast feeding, provides medical, economic, and educational facilities, and its work has attracted such wide attention and approval that more than 100 similar institutions are now in operation, on a larger or smaller scale, in England, Scotland, and Wales, some being run by the municipalities, but the bulk by voluntary contributions and private charitable organizations. In a general way these schools for mothers are modeled on the French Consultations de Nourrissons, but have materially expanded that idea. An Association of Infant Consultations and Schools for Mothers has recently been established under the auspices and as a branch of the National League of Physical Education and Improvement, and the National Health Society and various philanthropic organizations have more than 1,000 paid, or voluntary, health visitors, who supplement the work and activities of the schools for mothers. The medical officers heartily cooperate with these varied institutions in so far as practicable, Dr. Arthur Newsholme, medical officer of the local government board, Dr. S. G. Moore, medical officer of health at Huddersfield, and many of their associates have made exceedingly valuable contributions to the statistical study of infant mortality, and under direction of the board of education a notable memorandum on the "Teaching of infant care and management in public elementary schools" was prepared by Dr. Janet M. Campbell, and published in 1910 (Circular 758), with a view to accelerating and shaping the movement on those lines now rapidly taking form in England. The Women's National Health Association of Ireland, the City Infant Mortality Committee of Dublin, and the 14 babies' clubs working under the management of branches of the National Health Associa-

tion are actively engaged in the infant-welfare campaign in Ireland, and in Scotland many similar agencies in addition to those incidentally named on previous pages are at work.

In response to my inquiry, Dr. T. H. C. Stevenson, the statistician of the General Register Office, writes me:

> My view as to the effect of the efforts already made in this country was stated as follows in the Annual Report of the Registrar-General for 1909, page xliv: "It is impossible to avoid associating this decline (i. e., in infantile mortality from 1900, and especially from 1905 onward) with the simultaneous increase of effort to reduce infant mortality."

In his introductory address at the recent meeting of the National Association for the Prevention of Infant Mortality the Right Hon. John Burns, president of the local government board, said:

> Now you will probably ask me, as is your duty, what I believe are the chief causes of this satisfactory decline in infant mortality. I am here to say, as a practical man, that it is not due to any one special reason. It is due to a stream of causes, many experiments, and endless ideas, all converging on how to protect the mother, save the infant, guard the child, and reinvigorate the race. It is due to no special cause, or any special set of men.

THE MOVEMENT IN FRANCE.

In the preceding study of the origin and evolution of the world's effort to diminish infant mortality, as the acknowledged pioneer in the movement in general, and also in many of its most important features, France of course occupied the front of the stage, and any extended review of the present status of the movement in France would be a mere repetition with comparatively unimportant supplemental details added. The Crèche, the Goutte de Lait, the Consultation de Nourrissons, the Pouponniere, and the Ligue Française contre la Mortalité Infantile of to-day are modern amplifications of those previously alluded to, materially increased in number, in efficiency, and in breadth of service. In so far as I have been able to learn, there have been no new forms or classes of institutions of importance established in France since the organization of the International Congress of Gouttes de Lait in 1905, with the possible exception of the Fondation Pierre Budin, which was founded in 1907 as a memorial to the distinguished pediatrist whose name it bears, and conducts on a large scale the Consultations de Nourrissons originated by him.

Dr. Lucien March, le directeur de la statistique générale de la France, has kindly advised me, however, of some important changes in the French law applying to infant mortality in the last few years, and it would seem that the Government is gradually becoming more closely identified with the movement, not only financially but in various other ways. The decree of May 2, 1897, and the regulations

of December 20, 1897, provide for the supervision of crèches and places caring for children under 3 years of age. The law of June 27, 1904, places "enfants assisté" under the protection or guardianship of the State. The statute of November 27, 1909, guarantees their employment to lying-in women. The interruption of their work for eight weeks preceding and following their confinement will not warrant the termination of their engagement by the employer, on penalty of the recovery of damages with interest by the female workers concerned. By the law of March 15, 1910, a two-months' leave, half before and half after confinement, with treatment at institutions, is provided for, and the law of April 6, 1910, interdicts the selling, offering for sale, exposure, or importation of nursling bottles with tubes. The State has never participated as yet in the establishment or management of crèches, consultations de nourrissons, gouttes de lait, or similar institutions, but has encouraged them by subsidies. In 1911, Dr. March informs me, these governmental subsidies amounted to slightly more than 600,000 francs, distributed as follows:

	Francs.
Oeuvres d'assistance maternelle, mutualites maternelles, consultations de nourrissons, gouttes de lait	465,205
Crèches	121,000
Subventions aux communes allouant des secours aux mères indigentes pendant le mois qui suit l'accouchement	13,795

THE MOVEMENT IN ITALY.

In Italy the birth rate is high, the wages low, and the illiteracy exceptionally high, at last reports 506 out of every 1,000 women who married being unable to sign their names. The infant-mortality problem is therefore an exceedingly serious one, and a great variety of experiments in the way of grappling with it has recently been crowned with the creation of the first national maternity insurance fund ever established by any nation. The bill establishing this institution was adopted by Parliament July 17, 1910, and was the outcome of an agitation on the subject dating back 16 years, the organization of a private maternity insurance institution having been first proposed at the Workingmen's Insurance Congress held at Milan in 1894. A private maternity insurance fund was established at Turin in 1898, and in the next few years at least five maternity benefit societies are known to have been organized in the larger cities of Italy, but the enactment on June 19, 1902, of the law specifically prohibiting the employment of women within one month after childbirth greatly aroused interest in the subject of maternity insurance. The law provided that in exceptional cases the period of nonemployment might be reduced to three weeks, if the mother could furnish a certificate signed by the local bureau of hygiene certifying that her health was such she could safely return to her occupation, but even in that event she would be

enjoined from earning money for at least three weeks, and both chambers of Parliament adopted resolutions calling upon the Government to prepare a plan for the establishment of a maternity insurance institution in which membership should be compulsory for the female workers to whom the law applied, namely, employees of mines, factories, and workshops. The Italian bureau of labor was directed to investigate the probable cost of the proposed plan, in 1904 published its report, including 172,365 female employees in 2,654 establishments, and after six years of discussion of the subject in Parliament the law of 1910 was enacted. It provides for a maternity benefit of 40 lire ($7.72), three-fourths of which is to come from the fund and one-fourth from the State. A compulsory annual contribution is required from all women between 15 and 50 years of age to whom the law applies, to be paid in equal shares by employer and employee. For women between 15 and 20 the annual contribution is 1 lira (19.3 cents), and for women from 20 to 50 the annual contribution is 2 lire. The present imperial law of Germany and the new national insurance act of Great Britain provide for maternity insurance, but the Italian creation of 1910 was the first national institution of its kind in the world.

Half a century ago there was founded at Milan an institution under the name of the "Associazione Nazionale Operaia Femminile," which maintained a maternity section for the purpose of assisting mothers so that they might nurse their infants. Many other organizations, either charitable or self-sustaining on the mutual insurance principle, have since been established, with similar aims. The Brefotrofio, or foundling asylum, is an institution in evidence in nearly all parts of Italy, and several years since it was reported that more than 3,000 communes aided indigent mothers to enable them to nurse their young or hire nursing. Day nurseries are an established institution in Italy, dating back to 1850, only six years after the pioneer crèche was founded in Paris by Marbeau, and the present Italian law regulating the employment of women and children provides that in all factories where over 50 women are at work a room must be provided in which the mothers can nurse their babies. The Consultation de Nourrissons is not entirely an unknown institution in Italy, but apparently has made less headway there than in most European countries, the belief that breast feeding is not really needed being very common among the more ignorant mothers. In some communes a booklet dealing with the hygiene of infants is given to each newly wedded couple, there are several journals devoted to the hygiene of mothers and infants, and the Italian pediatrists have fully awakened to the importance of encouraging breast feeding as the surest means of reducing infant mortality, and through numerous channels are endeavoring to impress that fact upon the working classes of women.

THE MOVEMENT IN AUSTRIA-HUNGARY.

For many years Austria has had the highest illegitimate birth rates of any European country—with the possible exception of Russia, for which no recent figures are obtainable—and at least up to a very recent date led all the countries of Europe, aside from Russia, in its infant-mortality rate. In its extended reply to my inquiry the Imperial Royal Statistical Central Commission begins its communication with the frank statement: "The efforts along the line of infant care and protection of motherhood in Austria have the purpose of reducing the infant mortality in Austria, which still holds the enormous figure of 20 per cent." The communication goes on to note that the methods planned by the late Dr. Theodore Escherich, professor at the University of Vienna and founder and director of the Society for the Protection of Infants in Vienna, have opened the way for the present movement, and that the institution founded by Dr. Escherich has served as a model for similar institutions. His suggestion of the necessity for the establishment of a central office for the care of infants, the foundation of mothers' schools, and the education of women to the duties of motherhood, and the building up of an extensive propaganda for breast nursing, formed the basis on which Dr. Leopold Moll worked out his draft for an imperial institution in honor of the Emperor Franz Josef's jubilee. The draft was submitted to the Grand Commission of the Emperor-Jubilee-Fund for the protection of infants and child welfare, was unanimously accepted, and the proposed institution has been founded under the name of the Kaiser-Jubilaeums-Reichsanstalt für Mütterschütz und Säuglingsfürsorge.

The work planned for the institution consists of (1) the training of nurses, and orphan-asylum nurses already engaged in public institutions on all the Crown lands, and midwives to qualify them for infant nurses, and also of professional nurses and infant nurses; (2) establishing for physicians post-graduate courses in pediatrics and child hygiene; (3) the instruction of mothers in feeding babies and bringing up children; (4) helping motherless babies, destitute mothers, and their children, sick, underfed, and destitute children, and rearing needy, neglected, and defective children. In addition to the imperial institution, a central organization office for the care of infants and protection of children is to be established, and this office will have the threefold purpose of serving in an advisory, instructive, and legislative capacity. The imperial royal statistical central office is now engaged in an investigation of all existing institutions for the protection of infants and child welfare, and announces that recommendations and propositions advanced by scientists and commissions have been received with deep interest and promise of careful consideration

by the Government and its legislative bodies. Its reply to the inquiry concludes with a list of 21 infants' homes, day nurseries, and institutions for children under 6 years of age, all of which are located in Vienna.

According to the latest available returns, the birth rate and infant death rate in Hungary were even higher than those for Austria, and the rate of illegitimate births was also exceptionally high, though not so high as that of Austria. Consequently the two sections of the Austro-Hungarian monarchy have similar infant-mortality problems with which to deal. Nearly 35 years ago Dr. Szalardi startled the Royal Medical Association of Budapest with his revelation concerning babies born in Budapest and given out to country wet nurses to the effect that the municipal authorities admitted that fully 90 per cent of these babies died in the first year. An investigation of the Rokus Hospital disclosed that as high as 91.14 per cent of the illegitimate children born there died. When one of these unfortunates was handed over to one of the country wet nurses, the nurse received 20 gulden, and, it was said, was promised an additional 20 gulden if the baby died.

Hungary now boasts that these conditions are things of the past, and that it has one of the best systems of combating infant mortality, the first paragraph of its laws for State infant protection providing that "every child who can not be taken care of by his father or mother has a right to care by the Hungarian State." If possible, a baby's parents, grandparents, or other relatives are called upon to care for it, but if none of them can be made to do so the State cares for it until it is 15, this protection applying to all children in Hungary irrespective of their nationality or legitimate or illegitimate birth. Only sickly babies are kept in institutions, all others being given to foster parents selected and supervised by the State.

In 1910 no less than 54,478 children were under State protection, and the State first admits all children who seem to need its care, and afterward investigates the conditions of the case. The board of orphans looks into the case, decides what is to be done, and whether the child should be returned to its mother, and thus the child is not exposed to any great risk of neglect through the exercise of red tape. There are now 17 State asylums in Hungary in which children are cared for, and whenever possible the State insists that the mother remain for a while with her child in the asylum and nurse it. Indigent mothers who work away from their homes are often admitted to the asylums on their promise to nurse their children and not go to work for a few months. All told, Hungary now appropriates between 81,000,000 and 82,000,000 crowns (approximately $16,000,000) each year for the care of its child wards.

THE MOVEMENT IN BELGIUM.

The Belgian law of December 13, 1889, dealing with women's work, children, and infants, prohibits the employment of mothers within four weeks after childbirth, and the Government's regulations for the examination of midwives since 1908 have provided that they shall be questioned as to the fundamental requirements of infant hygiene. The regulations also provide that conferences on infant hygiene shall be held in all arrondissements where the infant death rate is above the average for the kingdom. Sanitary measures recently recommended by the Government provide for the systematic supervision by the authorities designated of all places where children under 7 years of age are put to nurse, or to be cared for, and also provides that subsidies for Consultations de Nourrissons, or other public or private institutions for the protection of infants shall be apportioned according to the individual conditions by royal decree. For nearly 20 years the Government has enforced a carefully drawn code of regulations, from time to time amended, dealing with the milk traffic, and in 1894 organized action on Gouttes de Lait lines commenced in Belgium with the organization of the Belgium Société des Gouttes de Lait.

In his detailed and interesting response to my inquiry, M. Maurice Sauveur, secretaire generale du ministère de l'intèrieur, states that Belgium has no official bureau of child hygiene, and maintains no milk stations or similar institutions, deeming it preferable to subsidize them. The Ligue Nationale pour la Protection de l'Enfance du Premier Âge has been in existence since 1903, and has maintained an active propaganda, promoted conferences, and otherwise aided in the movement against infant mortality. Two other associations, the Ligue de l'Education Familiale, which was founded in 1899, and the Société Belge de Pedotechnie, render like service in posting the public on child hygiene. There are about 40 consultations de nourrissons, some of which were founded by municipal communes but more by private enterprise, and about 50 crèches for the most part private institutions aided by the communes. In addition to these latter, there are some crèches established by large industries. Some communes supplement their subsidies by distributing among young married couples brochures containing hints on the proper rearing of young children, and all told the Belgian Government annually appropriates about 30,000 francs in subsidies for child-welfare institutions. In 1905 the communal council of Ghent prohibited the use of nursing bottles with long tubes.

THE MOVEMENT IN RUSSIA.

Unfortunately, the only Russian data for this paper forwarded in response to the inquiry addressed to the office of the ministère de l'intèrieur comité central de statistique St. Pètersbourg were in the form of a 36-page tabular summary of the "Mortalité des enfants de moins d'un an en 1909 dans 38 gouvernements de la Russie d'Europe," arranged by districts, cities, ages, sexes, and various other classifications, the total deaths under 1 year in 1909 thus recorded aggregating 985,797 in the 38 subsidiary governments in question. The brief explanatory text accompanying these figures sheds no light on the methods or measures already taken, or contemplated for combating infant mortality in Russia, and I am therefore unable to present herewith any first-hand information on that interesting subject—in which not only the highest infant death rate of the civilized world, but more than one-half of the total infant mortality of all Europe are involved—with the exception of certain authoritative facts gleaned from (1) the exceedingly interesting paper presented before the Third International Congress for Infant Protection, at Berlin last year, by Dr. Wladislaw Hubert, of St. Petersburg, and (2) the Twenty-fourth Annual Report of the United States Commissioner of Labor.

Dr. Hubert is a privy councillor, president of the Russian Society of Public Hygiene, and an honorary lecturer at the Imperial Military-Medical Academy, and his paper on "The present status of the inquiry regarding the infant mortality in Russia and its reduction," unquestionably constitutes one of the broadest and most instructive reviews of that highly interesting topic which has ever appeared to date, at least outside the field of Russian publications. His paper was read and published in German, in the voluminous Transactions of the Third Congress, and at the very outset concedes that more than 1,500,000 of the 5,000,000 to 6,000,000 children annually born in European Russia die during the first year, or in other words, that the infant mortality rate of European Russia as a whole exceeds 250 per 1,000 births. And in a startling tabulation included in his paper, Dr. Hubert shows that in 280 out of 501 districts the infant death rate exceeds 250 per 1,000 births, in 271 districts ranging from 300 to 450, and in no less than 10 districts amounting to 500 or more. The vast majority of the Russian working population of about 125,000,000 are neither thrifty not energetic, Dr. Hubert tells us, and the high infant mortality operates to the detriment of the national organism, and so affects the physical and mental powers of the population as to lower the productive and economic strength of the nation. As he puts it:

> It is therefore clear, and important, that the broad interchange of views on these questions at the coming Russian Gongress for the Reduction of Infant Mortality, to

be held at St. Petersburg in April, 1912 (Dr. Hubert's address was delivered in September, 1911), will constitute a real development.

The recognition of the great importance which breast feeding plays in the fight against infant mortality has led to the establishment in many Russian cities of "Milchtropfen," or "Gouttes de Lait," and one of the first experiments on this line was made in 1901 under the auspices of the Society of Public Hygiene at the St. Petersburg municipal institution for prematurely born children. At last reports there were 6 milk stations in St. Petersburg, handling about 800 babies, and in 1909 there were about 40 in various cities and 7 in villages in Russia. The first day nursery in Russia was founded by Prince Barjatinsky in 1845—the year following the establishment of Marbeau's pioneer crèche in Paris; the second in 1865 by the Countess Miljutin, and there is now a large number of day nurseries in all sections of the Empire under either municipal or private direction. On August 17, 1911, the Russian Society of Public Hygiene appointed a permanent committee to the International Union for the Protection of Infant Life. In so far as I have noted, no announcement of the deliberations or results of the Russian Congress for Infant Protection and the Reduction of Infant Mortality, which was to have been held in April last, has yet appeared in any American or European publications outside of Russia. But the program, which had been announced, was broad and promising, comprising these three sections: (1) Study and statistics of infant mortality; (2) Causes for the excessive infant mortality in Russia; (3) The crusade against infant mortality.

In the latest issue of the annual report of the United States Commissioner of Labor (Twenty-fourth, Vol. II, pp. 2210 et seq.) it is authoritatively stated that the regulations for the Province of Moscow, outside of the city of Moscow, laid down by the provincial factory commission, provide that in factories—

where 200 or more women are employed, a special maternity room must be provided and also the services of a resident trained midwife; where less than 200 women are employed, such room and the services of a midwife must be furnished by the employer when necessary. Only three commissions, those of St. Petersburg, Moscow, and Warsaw Provinces, require maternity wards in factories employing considerable numbers of workers. A few commissions have established a maximum time limit of three months for this free medical help.

THE MOVEMENT IN ROUMANIA.

Although the population of the Kingdom now amounts to nearly 7,000,000, is nearly as large as that of Belgium, and exceeds the populations of Turkey, the Netherlands, Portugal, Sweden, Switzerland, Denmark, Greece, and Norway, Roumania is practically a terra incognita at this end of the world, and probably the vast majority of

students of the infant-mortality problem would fail to take that country into account in striking the world's balance sheet of movements for the reduction of the infant death rate. It must be borne in mind, however, that Roumania has a population more than one-half again as large as is the total population of the Australian Commonwealth, that its population for many years has been increasing at a much higher rate than that of any other European country of equal size with the exception of Germany and Russia, and that its birth rate is the highest in Europe with the single exception of that of Russia. These facts obviously call for the consideration of Roumania in the discussion of the infant-mortality crusade, and the active participation of the country in this movement fairly entitles it to that consideration. The output of its statistical bureau, known as the service de la statistique générale, under the administration of its director, Dr. Leonid Colescu, is amazingly comprehensive and complete for that of a country of the size of Roumania, and in all the voluminous correspondence incidental to the preparation of this paper no country of similar magnitude has approached it in the volume of data supplied. Included in the information furnished are two papers by Madame Marie Coutzarida Cratunesco, presidente de la Société Maternelle des Crèches, at Bucharest, and doctor in medicine of the faculty of Paris, which were presented by that lady at the Congres de l'Assistance Publique et des Oeuvres de Bienfaisance and the Second International Congress of Gouttes de Lait, and deal respectively with the crèches and divers institutions established in Roumania in the crusade against infant mortality. From these papers, the various statistical reports, and the correspondence with which Dr. Colescu has favored me, I have compiled this brief and incomplete sketch of Roumania's activities on these lines.

Article 81 of the country's sanitary law requires the mayors to pay especial attention to abandoned children, nursing babies, and the newly born, and the same article provides that pregnant and lying-in women, the aged and infirm, and the orphans of the poor shall be under the special care of the communes. In furtherance of the provisions of this law, various institutions have been established, some of which are herewith briefly mentioned. The oldest is l'Institut Gregorian, at Issy, founded by Prince Gregoire Ghica, where abandoned babies are placed and cared for. The institution known as the Berceau Sainte Catherine was founded by the Princess Catherine G. Cantacuzene, with the cooperation of many of the most prominent ladies in Roumanian society, was opened November 25, 1897, and is devoted to the care of children of poor families up to the age of 2 years. Under the direction of the chief of the sanitary office a section of this institution is especially provided and run for babies

of the poor whose mothers have died in or immediately following childbirth. The institution is liberally endowed, has a large and thoroughly equipped home of its own, has rendered effective service for the last 15 years, is conducted by La Société Leaganul ou Crèche Santa-Catherine, and is run on the general plan of the Pouponniere at Porchefontaine, near Versailles, in France, the pioneer in its line. The institution known as the Materna is conducted by a committee under the presidency of Madame Dr. Cratunescu, and the municipality of Bucharest there cares for abandoned children up to the age of 7 years, and also for the babies of the working poor who are prevented by their work from caring for them. All of these institutions are located in the capital of the kingdom, Bucharest, and there also are located a crèche conducted by M. Cantacuzino, and a crèche in close proximity to a great tobacco establishment at which the babies of the women there employed are cared for during the day. Day nurseries are run by society women at Braila and Galatzi, and at Craiova there is the institution known as "Madona Dudu" at which the babies of the poor are cared for.

The municipal hospital at Bucharest, "L'Ephorie," has a sanitarium at Techirghiol at which poor children with tuberculosis are received, and the Bucharest Société pour la Prophylaxie de la Tuberculose des Enfants also has a sanitarium at the same point to which children up to 12 years of age are admitted. The State makes a substantial appropriation for the support of this institution, and also maintains in whole or part various other hospitals or homes for infants and children. All told, Roumania has a surprisingly large equipment of hospitals, crèches, and gouttes de lait, and is unquestionably contributing its full share to the fight against infant mortality.

THE MOVEMENT IN OTHER EUROPEAN COUNTRIES.

In addition to the European countries whose kind responses to my inquiry have already been reviewed, returns to the inquiry have also been received from the bureau central de statistique des Pays-Bas, the bureau municipal de statistique, of Amsterdam; bureau central de statistique, of Norway; el director general del Instituto Geográfico y Estadístico, of Spain; and the bureau central de statistique de Suède. Dr. Philipp Falkenburg, the director of the Amsterdam bureau, writes that a book by Prof. Keller, of Berlin, shortly to be published at Jena, will contain a study by Dr. Graanboom and Dr. van Heusde on the subject of infant mortality in general and the efforts for its reduction in the Netherlands. The Norwegian bureau central de statistique is authority for the statement that there are now two lying-in hospitals officially conducted, one in Kristiania and one in Bergen, and that both are combined with schools for mid-

wives and consultations de nourrissons. The State also contributes to homes for mothers, three in Kristiania, one in Bergen, and one in Stavanger. The "Rigshospital" maintains a division especially devoted to children; new milk is distributed extensively for babies from several divisions of "Norske Kvinders Sanitetsforening"; and homes and charitable institutions for the care of infants and children are supported by private efforts in all parts of Norway.

The director in chief of the bureau central de statistique de Suède, Dr. Jacob Ludwig Widell, announces that—

by way of legislation little has been done directly to diminish infant mortality. This has in Sweden, as you will observe, already long since been so very low that statutory action has been less needed here than in other countries. The mortality in the first year of life per 1,000 living births was 81 in 1906, 76.8 in 1907, 85.4 in 1908, 72.2 in 1909, and 75.1 in 1910. A great deal of private effort, however, has been made for reducing infant mortality still more. Especially deserving of mention in this conjunction is the establishment of milk stations and krippen in many towns.

In addition to the European data already presented, a brief postscript might be added in the form of the statement that Austria, Bosnia and Herzegovina, Denmark, Holland, Norway, Roumania, Spain, and Switzerland all now have statutes prohibiting the employment of child-bearing women for anywhere from three to eight weeks after confinement. The Spanish law of March 13, 1900, also compels employers to allow at least one hour without deduction of wage, each day, for the nursing mother to nurse her baby, and this hour may be divided into two half hours at the mother's pleasure on her notifying the employer of the times so selected.

THE MOVEMENT IN AUSTRALIA.

Though geographically far distant from the centers of European activities in the campaign against infant mortality, Australia has "felt the touch" of the movement and has energetically responded. In fact in some respects the movement on the other side of the world has been more systematically mapped out and carried out than in many a much larger, older, and wealthier eastern country. Mr. G. H. Knibbs, the Commonwealth statistician, writes that "practically the whole of the information available in this bureau on the subject of the importance to diminish infant mortality is embodied in the fifth Official Year-Book," which he has sent to me, and in that extraordinary work of 1,277 pages I find an entire chapter devoted to the subject of "Supervision of infant life," and an impressive array of tabulations and graphics dealing with infant mortality in various sections of the Commonwealth.

As all familiar with the relative infant-mortality rates of various sections of the world are of course aware, Australia has never ranked

among the sections with high infant death rates, but has continuously been at the very bottom of the list of countries arranged in the order of their rates graded downward. In 1901 its rate was but 103.61 per 1,000 births, and from 1903 to 1910 it underwent a practically continuous decline from 111.36 to 74.81. This latter figure was lower than those of even Norway, Sweden, and Ireland. At the introduction of his chapter on "Supervision of infant life" Mr. Knibbs modestly puts it for Australia:

> It has been frequently stated in recent years that when the social, climatic, and industrial conditions are taken into consideration the infantile mortality of Australia, particularly in the large towns, is much higher than it should be.

In view of the fact that the Australian rate is considerably less than one-half as high as the average infant-mortality rate for all the countries of Europe in the quarter century ending with 1905, this statement that it "is much higher than it should be" may be fairly termed a modest one, I think.

With this start the Commonwealth statistician goes on to remark:

> It is now generally recognized, however, that infant mortality is largely attributable to parental ignorance and neglect, and that in particular improper feeding is accountable for perhaps the majority of infant deaths. In all the States of the Commonwealth acts have been passed with the object of generally supervising the conditions of infant life and of reducing the rate of infantile mortality, and in many of the large towns measures have been adopted by private individuals to spread among the mothers a knowledge of the best methods of feeding and caring for their infants. Milk institutes have also been established after the manner of the Gouttes de Lait in Europe, with the object of reducing the number of deaths of infants from milk poisoning in the summer months. For every infant death recorded there are probably three or four survivors who have sustained more or less serious permanent physical danger quite apart from injuries at birth or congenital causes. It is stated that the far-reaching influence of the first year or two of life upon the whole subsequent physical welfare of the individual can not be recognized too clearly, and it has been alleged that many serious defects and diseases occurring in later life may be credited to results ensuing from infantile disease. This is particularly the case in respect of digestive diseases.

In New South Wales, Western Australia, and New Zealand a statute is in force prohibiting the employment of women within four weeks after childbirth. In New South Wales, Victoria, and Queensland infants' protection acts provide for the licensing and regulation of homes to which young children may be farmed out, and in New South Wales there is a State children's relief board under the direct control of an honorary board of nine members and under the administration of the minister of public instruction. In all six States of the Australian Commonwealth there are more or less comprehensive regulations applying to the supervision of the milk traffic.

The acting government statistician of New South Wales advises me that—

The medical officer of health of the Sydney combined sanitary districts, Dr. W. G. Armstrong, for some years past has made systematic efforts toward instructing mothers of newly born children. He has a staff of three trained nurses, inspectors who visit about 55 per cent of the children born in the metropolitan area within five weeks of birth. The mothers are presented by these inspectors with a copy of the pamphlet on How To Take Care of Babies, issued by the department of public health, or with leaflets on the same subject distributed by the city council. Naturally these visits are paid only to the thickly populated, poorer districts, and the nursing inspectors are at all times well received by the mothers. Again, when the birth of a child is being registered, the district registrar of births supplies to the parents a copy of the pamphlet above mentioned. This work has now been carried on for eight years, and the work of visiting the mothers of newly born children has been actively continued in the city of Sydney for seven years with results which appear to be very satisfactory.

In the city 1,554 mothers were visited (395 primiparæ), of whom it was found that 1,291, or 83.1 per cent, had entirely breast fed their infants up to the time of visitation; 231 infants were partly breast fed, and 32 were not breast fed at all. In the suburbs 2,099 mothers were visited (564 primiparæ). In 1,751 cases, or 83.4 per cent of the whole, the children at the time of the first visit were found to have been entirely breast fed, 279 children were partly breast fed, and 69 were entirely artificially fed. It will be noted that the proportion of breast-fed children in the city of Sydney has increased steadily year by year since the inception of the practice, a fact which may be considered very encouraging. All the nursing mothers, both in the city and suburbs, were presented with the pamphlet issued by the department of public health entitled How To Take Care of Babies during the Summer Months. In the infants' homes, principally for the poor and unfortunate, fully 50 per cent of the cases treated are of illegitimate births. In these homes the mothers are frequently admitted with the children.

In Melbourne the Lady Talbot Milk Institute was established in 1908, to provide pure milk for infants, and in the first annual report it was stated that out of about 300 infants supplied with milk by the institute during 1908–9 only 8 died. Crèches have been established in many of the suburbs of Melbourne and also organized by private enterprises in other large towns of the Commonwealth. In Sydney there is a school for mothers, the Alice Rawson School, to which parents are invited to take their children by the nursing inspectors of the city council. The mothers are then kept in touch by the nurses of the school by visits at regular intervals—thus continuing the work begun by the nursing inspectors. In short, Australia has intelligently and energetically grappled with its share of the infant mortality problem, even though the States of Australasia already have, and long have had, the very lowest infant death rates in the world.

THE MOVEMENT IN THE UNITED STATES.

The differences between far-away Australasia and the United States, it is needless to say, are many and striking, and in their respective infant-mortality rates and methods of dealing with the infant-mortality problem the differences are particularly striking. The States constituting the Australian Commonwealth are effectively

welded together, and much more effectively welded together than are the States of the United States in the handling of problems like that which is the subject of this paper. In the case of both commonwealths, in many things the interests of their respective entire populations are substantially identical, but in many respects it would seem that the State lines in this country are much more sharply drawn than in Australia. Consequently, in the handling of, for instance, even the broadest questions of public health in which infant mortality plays so conspicuous a part, there is a lack of unity of plan and concentration of effort in the United States which is, to put it mildly, lamentable.

To be sure, there now is, and has been for substantially three years, a national organization in this country under the name of the American Association for Study and Prevention of Infant Mortality, whose purpose is to nationalize and systematize the movement which its name suggests. This association has already held two annual conventions, and its third convention is scheduled for next week, at Cleveland, and that it has already done much to attract the attention of the American public to the infant-mortality question and been directly responsible for the establishment of milk stations and baby-welfare organizations in many American cities—and that its cumulative influence and broadening zone will eventually be productive of still more notable results—there is not the slightest question. Up to date, however, the most patriotic and self-satisfied American spokesman, with even superficial knowledge of relative values in the world's campaign against infant mortality, could scarcely contend that the United States as a whole had as yet actually grappled with the problem on any such basis as have, for instance, Germany, France, and Great Britain.

No physician with any reputation to lose would be willing to prescribe in a case of whose fundamental facts he was practically in total ignorance, and it is scarcely to be expected that a nation can or will seriously devote its money and attention to a problem in the case of which even an approximation of the dimensions is unknown and almost unknowable. It would be entirely unnecessary, not to say humilitating, to advise this notable body of demographers of the defective registration and varying accuracy of American vital statistics, and I have no intention of expanding on that topic. The world's statistical authorities having long since agreed on the uniform method of measuring infant mortality rates, namely, by working out the ratios of deaths under 1 year to registered living births, and not a single American city of any magnitude in so far as I am aware even pretending now to have a complete registration of the living births occurring within its confines, it is obviously a physical impossibility to compute with accuracy the infant mortality of any city of impor-

tance in this country—let alone any single State, the registration area, or the United States in its entirety.

Fortunately, there are a few American States which for some years have had, comparatively speaking, fairly accurate registrations of births and deaths, for instance, Massachusetts and Connecticut. And by a glance at their infant-mortality figures for the decade ending with, say, 1909, we may obtain at least a straw or two of evidence as to the general trend of infant mortality in this country, finding that in both of these States not only was there a considerable decline in the apparent infant death rates, but also in the actual numbers of infant deaths despite the increasing populations, in the decade in question. In New York City, Philadelphia, Boston, and at least a few other cities of importance with fairly complete birth registration there have been corresponding decreases in recent years, and it would seem reasonably safe to conclude that a complete enumeration of living births and deaths under 1 year would show at least a slight decrease, and certainly no increase, in this country's infant mortality of recent years.

I have supplemented the text of this paper with a tabulation of the infant-mortality experience for the decade ending with 1909 of 68 European cities, separately considered and also grouped by nations, have graphically traced the results of these tabulations in the chart which has been shown to you, and at the outset of my work on this paper had hoped that the collection of detailed returns from certain leading American cities might make possible the preparation on a much smaller scale of similar American tabulations and charts. In response to the inquiry addressed to the registration officials of all the registration States, and 50 of the leading registration cities, of this country, comparatively speaking only a mere handful of data has been forthcoming, although in some cases the officials in question undoubtedly have supplied practically all the information along the lines named which was at their disposal. In so far as statistical compilations are concerned, the American yield of the inquiry, it must be frankly admitted, is without the demographic pale, and I have found by actual experiment that any tabulation or chart based upon these data is practically meaningless and valueless. For these reasons it is impossible, in my judgment, to make any serious attempt, worthy of presentation before such a body as the division of demography of this congress, at even approximately measuring the past or present infant mortality of the United States as a whole, or of any considerable part of it. In brief, in the case of this country the effort to diminish infant mortality can only be treated on the basis of single units—that is to say, by roughly outlining the efforts which have been made or are now being made in a few of the more important cities.

New York City is not only the metropolis of the United States, and incidentally the Western Hemisphere, but is also by far the most conspicuous city of this continent from the viewpoint of the warfare now being waged against infant mortality. It therefore occupies the very center of the stage in the consideration of that movement in this country. As a municipal measure, the movement in New York City dates back scarcely 10 years, but in 1873 the New York Diet Kitchen Association was founded for the purpose of distributing nourishing food to the sick poor, of course to babies as well as adults. In 1891 at the Good Samaritan Dispensary pasteurized milk modified to a set formula was supplied to sick babies during the summer months, and in 1892 Nathan Strauss founded his pasteurized milk laboratories, opened his pioneer milk-distribution depots in New York City, and thus inaugurated the beneficent plan which has been so materially expanded by him, and introduced in many other cities, in the last 20 years. The Children's Aid Society entered the field in Brooklyn in 1901, temporarily established some milk depots in charge of a matron, and the health department supplied a physician to supervise the preparation of the pasteurized milk there dispensed.

Up to this time, the health department had only been identified with the movement against infant mortality to the extent of having a small summer corps visit sick babies in the tenements, but in 1902 it inaugurated a house-to-house canvass of the worst tenement districts. Nurses were assigned to follow up the cases in which they were needed, over 200,000 families were visited, dispensaries were established at recreation piers, and an inspection of the city's milk supply was undertaken. Its work on these lines gradually expanded, but it was not until 1908 that the division of child hygiene of the health department was established and provided with a chief, 5 assistant chiefs, 16 supervising inspectors, 1 superintendent of nurses, 5 supervising nurses, and 195 district nurses. The commissioner of health called a conference of all organizations and agencies interested in the campaign against infant mortality, the activities of the division of child hygiene were steadily expanded, and in the fall of 1910 the board of estimate and apportionment, impressed by the results of the 7 milk stations established by the New York Milk Committee in 1908, and continued on a larger scale in 1909 and 1910, appropriated the necessary fund for maintaining for the entire coming year 15 infants' milk depots under municipal control and under the immediate management of the division of child hygiene. Thus for the first time was the greatest city in the western world formally committed to the municipal maintenance of infant milk stations.

The New York Milk Committee had been organized in 1906 by a number of public-spirited New Yorkers as a result of a conference

called by the commissioner of health, the committee being especially designed to investigate the milk problem. In 1908, as above stated, this committee had opened 7 milk stations and, together with certain other charitable organizations, maintained a small number of these stations up to 1910. The appropriation by the board of estimate and apportionment in the fall of that year of the fund for the establishment of 15 of these stations at municipal expense aroused the New York Milk Committee to increased energy on these lines, the committee appointed a branch committee for the reduction of infant mortality, and that subcommittee was authorized to plan a campaign, raise money, and effect if possible a demonstration of the possibilities of milk stations on a wholesale basis.

With Mrs. J. Borden Harriman as chairman of its finance committee and a large number of other well-known society women associated with her, a vigorous canvass for funds was made with the well-to-do community of New York City, and although the canvass did not start until April, on May 31 the last of the 27 milk stations which the committee had planned was opened. At the invitation of the commissioner of health, the association of infants' milk stations was organized in that month by the 8 various agencies interested in the publicity campaign for the reduction of infant mortality and maintaining 79 milk stations, by a committee of the association the city was districted so as to prevent duplication of effort, and it was arranged that each station should send in a weekly report showing its enrollment and supplying all details of importance for tabulation and interchange.

At this writing, the 55 milk stations for which the city of New York had appropriated the necessary funds were in full operation, the Little Mothers' League, which had been inaugurated under the direction of the division of child hygiene to interest "the little mothers" of the public schools in the care of babies and general hygiene, had emphatically proved its usefulness, and the Junior Sea Breeze Hospital of the Association for Improving the Condition of the Poor, the Nathan Strauss Pasteurized Milk Laboratories, the Children's Aid Society of Brooklyn, the St. John's Guild, and various other agencies of proven ability were all playing active parts in the babies'-welfare movement in New York City. By means of the Babies' Welfare Association, recently organized, a particularly practical coordination of all the various agencies, municipal and charitable, identified with the milk stations of New York City was effected, returns on uniform lines are now collected, tabulated, and made public in weekly statistical bulletins, and the wide scope of the movement is demonstrated by the bulletin for the week ending September 14 last. In that week the total attendance at all the milk stations aggregated 17,535, no less than 65,940 quarts of milk were dispensed through the stations, and

from January 1, 1912, up to September 14 last the total number of recorded deaths under 1 year in the city of New York had been 10,545 as contrasted with a total of 11,116 infant deaths in the corresponding period of 1911. The 17,535 babies brought to the stations in the week in question represented considerably more than 10 per cent of the supposed population of New York under 1 year, and it would therefore seem that the greatest city in the United States was now committed on a wholesale basis to the "goutte-de-lait" plan inaugurated in France just about 20 years ago.

Of course, the present modified fundamental purpose of these institutions is really the encouragement of breast feeding, and the education of the ignorant class of mothers on proper methods of rearing their young; and the sale of good, safe, milk at a low figure—or its gratuitous distribution in cases of extreme poverty—practically is now only a means to those ends, rather than the primary purpose in view. In all probability the identification of New York City's municipality on a wholesale basis with this milk-station movement was materially accelerated, if not actually inspired, by the preliminary educational work on these lines of the New York milk committee. It was this committee, or its subcommittee for the reduction of infant mortality, which directly shaped the case, and presented the tabulations and charts which led the board of estimate and apportionment to appropriate the funds in the fall of 1911 for the 55 milk stations which were to be continuously maintained by the city for the entire year dating from their establishment, and in all probability from that time on.

Under the active direction of Paul E. Taylor, secretary of the New York milk committee and director of the committee for the reduction of infant mortality, and Dr. Philip Van Ingen, medical director of the last-named subcommittee, an elaborate special report of the subcommittee for the reduction of infant mortality of the New York milk committee, was compiled and recently published, including a great mass of statistical tabulations and charts illustrative of the campaign against infant mortality in New York City and other leading American cities. This report was undoubtedly the most comprehensive work of its kind ever published in this country, and in all probability in any country, and promises to prove an educational instrument of far-reaching service. In the main, the preceding outline of the history of present conditions of the movement in New York City has been compiled from this report.

Several other leading cities of the United States are now making vigorous efforts on lines similar in a general way to those of New York City to reduce their infant mortality, but, in so far as I am aware, Rochester, N. Y., is the only other American city which has formally established a milk station, or stations, at municipal expense. Chi-

cago's health department has had physicians make a house-to-house canvass among the mothers of the poor for the last four years during the summer months, has extensively circulated literature in relation to the care of the baby, and for the last three years has earnestly cooperated with the United Charities, the Infant Welfare Association, the Civic Federation, and other public-spirited organizations of the city. In Philadelphia in 1910 a conference called by the mayor was attended by some 200 representatives of agencies engaged in work in this field, the Modified Milk Society established 18 milk stations, and a division of child hygiene was established by the city's health department. In 1911 a "milk show" was held in the city at which the attendance exceeded 110,000, and the city council voted $5,000 for summer work among the babies of the poor.

In St. Louis, the Pure-Milk Commission was incorporated in 1904 for the purpose of distributing modified milk to poor babies, and in 1911 the Save the Babies League was formed, but the health department of the city apparently has taken no active part of the work up to date. In Baltimore, the Babies' Milk Fund Association, and the Maryland Association for the Study and Prevention of Infant Mortality have done some excellent work, and in 1911 nine milk stations were maintained and weekly clinics for babies held at them. Detroit has provided similar agencies for the last two years. Louisville, Rochester, and certain other cities have endeavored to exercise supervision over the milk traffic and in various ways provide good milk for poor babies, and the city of Cleveland has been especially active in the fight against infant mortality. Cleveland now maintains 13 prophylactic dispensaries employing 22 nurses as home visitors, and on June 16, 1911, the Central Dispensary and Milk Laboratory was dedicated to the babies of Cleveland. It is now proposed to erect and maintain a special hospital for babies, at a cost of about $325,000, and an annual expense of nearly $50,000, and it is planned to raise $1,000,000 for the erection of the building and its endowment. The city's board of health maintains a department of child hygiene.

In Boston, the division of child hygiene of the health department endeavors to get information regarding every baby born in Boston. Dr. W. J. Gallivan, chief of the bureau, writes that 10 nurses are assigned to this work, a duplicate of every birth return is sent to the division by the city registrar, and either by letter or visit of a nurse an attempt is made to learn how the newly born baby is going to be fed. The work of the division is subdivided into prenatal and postnatal work, medical inspection of schools, and physical examination of every child under 16 who seeks employment. The private agencies active in the campaign against infant mortality are the Floating Hospital, the Milk and Baby Hygiene Association, and the efforts of

Mrs. William Lowell Putman, who has employed a nurse to investigate the care of expectant mothers. The Milk and Baby Hygiene Association for the last three years has been in the very forefront of the movement in Boston, and during the last year had nearly 3,000 babies under its supervision, 10 milk stations being carried on by the association and mothers' clubs and classes of "little mothers," summer outings and various other means of endeavoring to reduce infant mortality being actively employed by the association.

A reprint of one of the Public Health Reports, published last year by the Public Health Service of the United States and compiled by J. W. Kerr, Assistant Surgeon General, presents a compact and very interesting résumé of "Data regarding operations of infants' milk depots in the United States in 1910," including data from 43 institutions located in 30 cities. Of these 43 depots 29 were maintained by private means, one partly by private means and partly by public appropriations, and regarding the means of maintaining the balance of the stations no information was forthcoming. New York and Pittsburgh are stated to be the only cities known to have provided funds for carrying on such work. A most elaborate collossal work dealing with the various phases of the relations of milk and the public health was also published by the United States Government, and many interesting casual studies of this and other phases of the infant-mortality problem have been issued by the various States' health departments.

To the best of my knowledge, the American Association for Study and Prevention of Infant Mortality, which was organized at New Haven, Conn., in November, 1909, and now numbers among its members a large number of baby-welfare organizations in various cities, and the Federation of Day Nurseries are the only organizations on a national basis in the United States which as yet could fairly be said to be directly associated with the movement for the reduction of infant mortality. The Federation of Day Nurseries is the outgrowth of two informal conferences held in Boston in 1897 and in Chicago in 1898, and it and the broad development of the day-nursery idea in the United States are largely the results of the personal work of Mrs. Arthur M. Dodge, of New York City, who has both fathered and mothered the movement in this country, so to speak, has studied the day-nursery, or crèche, plans of all the more important countries of the world, and for many years has been the very soul and center of this movement in the United States. The first day nursery in this country, if it may be so termed, was the Nursery and Child's Hospital in New York City, which was incorporated in 1854, "for the maintenance and care of the children by wet nurses and the daily charge of infants whose parents labor away from

home." This was 10 years after the establishment of the pioneer crèche in Paris, by Marbeau, and the movement has so expanded in the last 58 years that there now are about 500 day nurseries in the United States, at which some 20,000 or more children are cared for daily. Approximately 20 per cent of these children are babies under 1 year, and the day nurseries of the country in the main make a practice of caring for these children, if so desired, up to and even after their arrival at school age. There are local associations of day nurseries in New York City, Chicago, Philadelphia, Boston, and St. Louis.

Although practically all the countries of Europe and most if not all the States of the Australian Commonwealth have long had statutes prohibiting the employment of child-bearing women for anywhere from four to eight weeks after their confinement, there are but two States in this country which now have such laws on their statute books, and both of these laws are practically dead letters up to date, the provision reading that "no woman shall knowingly be employed in labor in a mercantile, manufacturing, or mechanical establishment within two weeks before or four weeks after childbirth," and not even suggesting any means by which the women so debarred from their employment after childbirth may be supported in default of their customary earnings. Of course self-preservation will compel the woman whose only means of support is thus cut off to conceal in so far as possible the fact that she is about to bring, or has just brought, a child into the world, and the experience with a similar British law for more than 20 years has shown that it is practically impossible to prove that the manufacturer violating the statute did so "knowingly." The New York law which has just been placed upon the statute books, and takes effect October 1 next, is copied from the pioneer law of the kind in this country, the Massachusetts statute, which was only enacted and approved in 1911. Although, as stated, these laws in their present form are obviously dead letters, their enactment has at least placed two great States on record as approving of the principle involved, and thus has paved the way for effective legislation on these lines sooner or later.

THE PRESENT STATUS OF THE WORLD-WIDE EFFORT TO DIMINISH INFANT MORTALITY AND ITS POSSIBILILIES.

To summarize, in closing, the contents of this paper, it would seem to be apparent that the more or less nationalized, systematized, world-wide effort to diminish infant mortality practically does not antedate the last decade. In fact, though isolated, spasmodic, individual efforts on these lines may perhaps be traced back even to the eighteenth century, it was not until national organizations and interna-

tional organizations with this end in view began to be formed that the movement could properly be termed an unified, world-wide, effort.

An accurate statistical summary of the results of the effort to date would be a physical impossibility, owing to the fact that no system of recording these results, even in individual cases, has as yet been devised which would furnish a basis for such a statistical summary on broad lines. Perhaps the difficulties of systematizing such an effort could not be better summarized than by quoting the following editorial from the issue for April, 1907 (Vol. XIX, No. 7), of "Public Health—the Journal of the Incorporated Society of Medical Officers of Health," of Great Britain, on the subject of "Statistical measurement of means employed to decrease infant mortality:"

It may be taken as evidence of a scientific spirit that we are anxious to proceed from the qualitative to the quantitative, and to measure the efficiency of measures recommended by us in the public interest by statistical results. Such measures may or may not be sufficiently accurate for the purpose for which they are utilized. They may furthermore, although accurate in themselves, not be able to allow for factors of variation of greater magnitude than the one which is being measured. There can be no better illustration of this than the question of municipal milk depots.

The infant mortality of an urban community which has had a milk depot for a number of years is found to have declined. How much of this is due to cool summers, and how much to the operations of the depot? Before one can begin to make the necessary comparisons on these lines it is first necessary to ascertain the magnitude of the operations of the depot. If in a community having 5,000 births annually, 500 have been fed from the depot; if these 500 have been each fed for a whole year on the depot milk, and if this feeding has been so successful that not a single baby has died from the results of bad feeding which might otherwise have accrued; and if it be assumed, contrary to the facts, that the sole cause of infant mortality is bad feeding, then the infantile mortality may, under these circumstances, have declined 10 per cent, say from 150 to 135 per 1,000 births. A greater effect could only be produced if the babies fed at the depot were specially selected. The illustration suffices to show that we have to deal with small differences, in which the factors of variation, other than depot or nondepot feeding can not be eliminated.

Even greater difficulties arise when the attempt is made to state the special mortality of the depot-fed babies in terms of the total numbers of depot-fed babies. A death rate must embrace the experience of a whole year, or correct for a more limited period. It must comprise babies of a similar age-distribution in the depot and the nondepot-fed groups; or it must make a correction for differences in this respect. If these corrections are not made the statistics are useless; and, so far, we have never seen them made with any completeness, and doubt if the conditions of work in these depots enable it to be done.

Although these considerations raise doubt as to the validity of comparisons between depot-fed babies and babies not thus fed in the same community, and, still more, between towns in which there are and are not milk depots, they do not effect the main question as to the utility of a pure milk supply for babies. The question is one that must be decided on general principles. Pure milk, whether obtained from municipal depots or elsewhere, is an essential condition of healthy infant life; and all efforts in this direction are of value, not only because of their immediate effect on infant mortality, but also because of their wider educational effect.

Of course, as the British journal argued, it would be contrary to the known facts in the case to contend that "the sole cause of infant

mortality is bad feeding," and hence by no means the entire decrease in the infant mortality rate of a town well supplied with milk stations could properly be credited to that one agency. The zone of operations and influence of milk stations, and all the other agencies for the reduction of infant mortality, in any large city at best must be more or less limited, and not only are numerous other factors constantly at work, for better or for worse, in determining the current infant mortality of the city, but at most the agencies for its reduction can play but a comparatively small part at any given time in fixing the figure for the entire community. It would be as absurd to give these agencies the credit for all the reduction in infant mortality which the vital statistics of the city might chance to show in any particular year as it would be to charge those agencies with the entire possible increase in the next year's infant mortality.

According to the returns presented by the Babies' Welfare Association for New York City, up to September 14 last, there had been 571 less deaths under 1 year, from all causes, in New York than in the corresponding period of the previous year, and at this rate the total reduction for the entire city for the entire current year would be 810 infant deaths, or a decrease of only 5.4 per cent from the total infant mortality of 15,017 in 1911. Assuming that this ratio should approximately hold good of the decrease in the infant mortality rate for 1912, the infant death rate of 111.6 for New York City in 1911 would drop only to 105.6, and if that slight decrease were the real measure of the service rendered by all the four score or so milk stations in New York, with its great population of approximately 5,000,000, the working efficiency of this means of reducing infant mortality would seem almost negligible.

This specific illustration demonstrates the impossibility of attempting to trace the results of any given means of reducing infant mortality by the crude figures of the entire community's decrease. Not even the merest approximation of the effects of the agencies in question could be statistically calculated without taking all the principal known factors in infant mortality into account, properly weighing each of them for its relative importance, and then reducing the experience of the agencies under investigation and that of the infant population without its zone of influence to a common basis. And, even then, the most carefully computed conclusions would be open to serious question.

In Germany, in the third quarter of 1911, the infant mortality was higher by 30,000, in consequence of the unusual summer heat, than the experience of previous years would have predicated, and an official bulletin (No. 1323) issued by the minister of the interior under date of May 25, 1912, so records. Presumably the total infant

mortality for 1911 must have shown a pronounced increase over that of 1910, and on the mere face of the vital statistics of Germany for the two years in question it would appear that there was an alarming upward shoot to Germany's infant mortality curve in 1911, despite its remarkable, nation-wide, campaign for the reduction of infant mortality, which had been more systematically and more vigorously pushed in that year than ever before. Manifestly, this supposed increase in the number of infant deaths in no way detracted from the beneficial results of the campaign, but for which the increase undoubtedly would have been much larger; but the case in point really emphasizes with exceptional force the difficulties—if not sheer impossibility—of recording in specific figures the actual saving of infant life effected up to date by the world-wide effort to diminish infant mortality.

That the effort in question, as yet scarcely launched, has been directly responsible for saving many thousands of babies who otherwise would have died, there can be no question. But neither the effort itself, nor the methods of recording its results, can as yet be regarded as sufficiently advanced to warrant sound statistical conclusions. In my judgment, up to date demography is practically powerless to reduce to figures the results of the effort to diminish infant mortality. That there has been a pronounced decrease in the number and rate of infant deaths in the last few years in the European countries which have seriously grappled with the problem, is an incontrovertible fact, and is demonstrated by the tabulations appended to this paper. As Dr. Stevenson, of the British registrar-general's office, said in his annual report for 1909, "it is impossible to avoid associating this decline with the simultaneous increase of effort to reduce infant mortality." But, just how much of the decrease is directly due to the effort to reduce infant mortality, and how much to entirely independent causes, meteorological and otherwise, no one can undertake to say with the slightest semblance of authority. As yet, that particular problem of vital statistics would seem to be without the confines of statistical investigation.

In so far as even a semblance of a statistical summary of the result of the effort to diminish infant mortality may be offered, I am inclined to believe that the appended tabulation of the number of infant deaths and the infant death rate in each of 68 European cities for each year of the decade ending with 1909, and the analysis of these figures and their decrease or increase by the two five-year periods involved, offer reasonably strong circumstantial evidence—though by no means mathematical proof—of the results, or at least the tendency, of the effort in question. In brief, the tabulation in question shows that in the five-year period, 1905–1909, there was a

more or less pronounced decrease in both the aggregate number of infant deaths and in the average infant death rate in the case of each of the national groups of cities therein presented, as compared with the returns for the five-year period immediately preceding. As the tabulation shows, in every one of the 30 leading German cities involved there was an actual, and in almost every case material, decrease in the infant death rate, and in all of those cities, with very few exceptions, there was a substantial decrease in the number of infant deaths, although, as shown by the tabulation, the populations of those cities had materially increased during the decade. In the case of the groups of cities in both France and Great Britain the results were similar, though less pronounced than in the case of the German cities, and in Italy, Belgium, Austria-Hungary, the Netherlands, and even Russia there were decreases in the infant mortality rate in the later five-year period, and in most cases decreases in the number of infant deaths.

It would be an entirely unwarranted conclusion, nevertheless, to assume that all of the decreases shown were direct results of the campaign against infant mortality. The world's general death rate has been decreasing with substantial uniformity in the case of civilized countries for many years, and especially for the last decade, and it would be natural to assume that the general improvement in medical knowledge and science, sanitation, and hygiene would operate to produce at least some decline in infant mortality rates as well as in the general death rate. Furthermore, the birth rates of practically all civilized countries, and especially in cities, have had a pronounced downward trend in the last 10 years, and while in most cases the downward move in birth rates was not sufficiently pronounced to offset the increases in population and thus decrease the actual number of births, nevertheless the decline in the birth rates would of course tend to decrease to a certain extent the number of births despite the increases in population. For these reasons, even the most sanguine worker for the reduction of infant mortality could not for a moment claim that all of the decrease which might be shown by five-year comparisons was due to the crusade against preventable infant mortality.

However, a comparison of the decreases in infant mortality and in the general death rates in the five-year periods in question will show that the decrease in the former case was generally much more pronounced than in the latter, and I venture to conclude that the general decrease in infant mortality rates, especially in the European cities in which a vigorous campaign has been conducted, at least affords indirect statistical evidence of the productive effect of the work on these lines.

The evidence, if "evidence" it may properly be termed, is much more convincing on account of the five-year scope of the comparison than would be similar data for any individual years, but at best could scarcely be regarded as statistical proof—let alone legal proof—of how much effect the movement has actually had up to date.

In the light of the most authoritative, up-to-date evidence furnished by the statistical bureaus of the various countries in response to the inquiry for this paper, I can personally regard the world-wide effort to diminish infant mortality as now only in its incipiency. A few countries, especially Germany, have advanced much further than others in systematizing and nationalizing their efforts, and the interchange of ideas, and plans, and experiences strongly tends to crystallize the movement throughout the civilized world on at least certain proven fundamental lines. In course of time, possibly in the not-far-distant future, there will be a definite international agreement on these fundamental points, and, unless I am seriously in error in my conclusions, the advanced nations will soon come to realize that lasting, permanent, results can only be secured by means of a wholesale education of the coming generation of mothers to the prime requisites of successful motherhood.

England is already partially committed to the necessity of making this subject part of the curriculum of its elementary schools, Germany is discussing the possibilities of similar action, and all authorities who have deeply studied the problem are substantially agreed that broader results may be secured with the mothers who are to be than with those whose minds and habits are already more or less fixed. With the latter class, the instructions and advice passed to them at the milk stations, consultations, schools for mothers, etc., doubtless will have some effect, and probably be the means of saving many thousands of infant lives. But, if certain fundamentals as to the great importance of breast feeding, cleanliness, and rational care of the baby can be effectively brought before the next generation of mothers in their early, plastic, years of school life—by means of exhibitions, moving pictures, prize offerings, or any other methods of really appealing to the mind of the growing girl—then, and perhaps not until then, the civilized world at large will unquestionably witness a real, widespread, and lasting reduction in its infant mortality.

A tabular study of the annual number and ratios per 1,000 living births in the preceding year of the deaths under 1 year in 68 leading European cities for the decade, 1900–1909, inclusive, and an analysis of the total numbers and average ratios and their decrease or increase by the quinquennial periods, 1900–1904, and 1905–1909.

[Compiled on the basis of the returns presented in the "Statistique démographique des grandes villes du monde, publiée a l'occasion de la XIII• Session de l'Institut International de Statistique à la Haye, septembre, 1911," by the bureau municipal de statistique d'Amsterdam.]

Cities.	Populations at beginning and end of decade, 1900–1910.		Number of deaths under 1 year, and rates per 1,000 living births in the preceding year.											
			1900		1901		1902		1903		1904		1905	
	1900	1910	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.
GERMANY.														
Aachen	135,245	156,044	1,050	227	1,002	220	904	192	829	185	896	207	924	208
Barmen	140,983	169,201	781	170	707	150	580	122	616	137	654	141	672	141
Berlin	1,888,848	2,070,695	11,762	239	11,325	227	8,928	177	9,452	191	9,783	205	10,170	208
Bochum	101,957	136,916	524	198	514	189	476	168	405	144	845	a 166	761	149
Bremen	163,297	246,827	866	191	799	168	859	170	974	163	1,070	176	1,110	176
Breslau	422,709	511,891	4,058	291	3,911	278	3,103	220	3,536	245	3,393	249	3,616	252
Cassel	106,034	153,078	523	172	492	161	394	130	435	143	502	164	430	140
Charlottenburg	189,305	305,181	883	186	856	182	661	140	845	187	807	172	778	165
Chemnitz	206,913	287,340	2,858	402	2,742	349	2,198	275	2,214	286	2,509	330	2,344	287
Cologne	372,529	516,167	3,554	257	3,650	255	3,110	212	2,983	204	3,434	235	3,264	216
Crefeld	106,893	129,412	653	213	549	184	442	143	399	133	462	161	384	139
Danzig	140,563	170,347	1,530	324	1,359	284	1,103	216	1,282	243	1,145	218	1,288	247
Dortmund	142,733	214,333	1,186	195	1,194	190	1,000	159	1,091	169	1,224	181	1,280	182
Dresden	396,146	546,882	2,658	201	2,482	196	2,100	161	2,962	233	2,915	189	3,036	200
Dusseldorf	213,711	357,702	1,612	200	1,710	210	1,462	176	1,557	188	1,736	209	1,658	194
Elberfeld	157,927	170,118	930	182	889	171	844	156	871	175	816	162	799	155
Essen	118,862	294,629	977	198	1,442	a 167	1,207	140	1,377	167	1,325	166	1,389	172
Frankfort on the Main	288,989	414,598	1,523,	206	1,326	158	1,225	144	1,453	170	1,459	170	1,577	172
Hamburg	705,738	932,166	3,742	180	3,980	196	3,023	151	3,459	174	3,321	171	3,542	178
Hanover	235,649	302,384	1,437	193	1,428	196	1,023	145	1,014	154	1,098	175	988	154
Königsberg	189,483	245,853	1,678	296	1,464	251	1,000	169	1,306	223	1,156	206	1,414	243
Leipzig	456,124	587,635	3,855	252	3,599	232	2,814	184	3,562	239	3,577	245	3,355	228
Magdeburg	229,667	279,685	1,929	265	1,702	236	1,392	199	1,514	227	1,612	247	1,505	236
Munich	499,959	595,053	5,272	318	4,508	257	4,292	235	4,075	228	3,834	224	3,659	219
Nürnberg	261,081	332,651	2,994	303	2,501	234	2,391	220	2,530	244	2,707	273	2,571	253
Plauen	73,888	121,104	684	268	592	214	646	216	750	246	862	257	797	213
Posen	117,033	156,696	1,044	a 271	1,176	306	820	194	1,040	233	1,111	243	1,298	260
Stettin	210,702	236,145	2,636	a 343	2,734	355	1,886	231	2,160	275	1,984	263	1,887	252
Strassburg	151,041	178,913	1,090	242	954	214	1,003	212	1,053	225	966	212	1,001	210
Stuttgart	176,699	285,589	1,175	231	1,082	212	1,146	208	1,108	201	1,076	196	1,413	253
Totals and average rates	8,600,708	11,105,235	65,464	240	62,669	221	52,032	182	56,852	201	58,279	207	58,910	203

a Ratio to living births in same year.

A tabular study of the annual number and ratios per 1,000 living births in the preceding year of the deaths under 1 year in 68 leading European cities for the decade, 1900–1909, inclusive, and an analysis of the total numbers and average ratios and their decrease or increase by the quinquennial periods, 1900–1904, and 1905–1909—Continued.

Cities.	Populations at beginning and end of decade, 1900–1910.		Number of deaths under 1 year, and rates per 1,000 living births in the preceding year.											
			1900		1901		1902		1903		1904		1905	
	1900	1910	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.
FRANCE.														
Bordeaux	256,638	261,678	686	133	596	114	553	115	567	113	541	112	470	101
Le Havre	130,196	136,159	869	213	707	180	758	188	630	159	715	188	651	174
Lille	210,696	217,807	1,462	230	1,390	223	1,307	207	1,264	214	1,188	206	1,175	215
Lyon	459,099	523,796	1,204	139	1,119	133	1,060	120	957	110	1,148	135	946	114
Nancy	102,559	119,949	435	186	386	171	363	153	336	146	374	157	373	152
Paris	2,714,068	2,888,110	6,629	120	6,426	114	6,251	110	5,610	101	5,954	109	5,667	106
St. Etienne	146,559	148,656	402	123	365	119	451	131	352	108	333	112	365	120
Totals and average rates	4,019,815	4,296,155	11,687	163	10,989	150	10,743	146	9,716	136	10,253	146	9,647	140
GREAT BRITAIN.														
Belfast	348,965	385,492	1,706	149	1,673	149	1,677	154	1,545	142	1,749	151	1,550	136
Birmingham	522,204	525,960	3,366	191	3,150	186	2,681	160	2,668	156	3,302	196	2,451	145
Bradford	279,767	288,505	945	172	1,085	161	911	141	974	148	1,038	157	873	139
Bristol	328,945	357,059	1,185	126	1,159	129	1,225	137	1,075	114	1,222	132	1,182	129
Derby	105,785	123,433	504	169	455	157	417	142	411	124	467	145	467	142
Dublin	373,179	403,030	1,787	168	1,724	167	1,793	174	1,639	148	1,886	173	1,602	143
Edinburgh	316,479	320,315	1,099	134	1,173	144	988	125	980	121	1,017	126	1,030	133
Glasgow	760,423	784,455	3,750	155	3,625	149	3,202	132	3,594	145	3,611	144	3,194	129
Hull	240,259	278,024	1,436	180	1,409	180	1,077	135	1,268	163	1,421	183	1,184	152
Liverpool	684,958	746,566	4,202	186	4,089	180	3,899	177	3,773	155	4,735	198	3,710	153
London **	4,536,267	4,522,961	20,730	159	19,412	148	18,478	140	16,978	130	18,600	145	16,324	130
Portsmouth	188,133	231,165	771	154	858	172	[a] 800	152	620	117	791	146	755	135
Totals and average rates	8,685,364	8,966,965	41,481	162	39,812	160	37,148	147	35,525	139	39,839	158	34,322	139
ITALY.														
Bologna	152,009	172,639	712	215	526	168	486	149	494	155	394	132	440	139
Genoa	234,710	272,077	922	170	1,117	204	888	151	870	147	884	153	975	161
Milan	491,460	599,200	1,853	149	2,194	174	1,958	149	1,864	142	1,801	139	1,946	145
Naples	563,540	723,208	2,477	147	2,732	166	2,474	150	2,533	149	2,728	158	2,598	156

** Population given are those for the registration city in 1901 and 1911.

Rome	462,783	538,634	1,394	120	1,330	115	1,519	132	1,746	145	1,744	144	1,848	152
Turin	335,656	427,733	1,217	164	1,098	154	1,058	146	1,054	144	1,047	151	912	127
Totals and average rates	2,240,158	2,733,491	8,575	161	8,997	164	8,383	146	8,561	147	8,598	146	8,719	147
BELGIUM.														
Antwerp	272,831	320,640	1,497	189	1,389	173	1,250	161	1,273	164	1,297	180	1,220	167
Brussels	558,012	665,806	942	197	861	187	731	158	761	174	602	154	645	168
Ghent	160,133	165,149	1,161	265	1,169	242	1,005	228	1,060	249	1,107	273	856	218
Liege	157,760	174,768	502	138	506	140	421	115	501	144	418	121	407	129
Totals and average rates	1,148,736	1,326,363	4,102	197	3,925	186	3,407	166	3,595	183	3,424	182	3,128	171
THE NETHERLANDS.														
Amsterdam	510,856	573,983	2,124	137	2,108	141	1,998	123	1,776	117	1,827	120	1,620	109
Rotterdam	318,507	426,888	1,941	171	2,134	177	1,662	135	1,830	148	1,644	135	1,606	125
Utrecht	102,086	120,208	510	152	556	168	505	148	457	129	532	154	471	134
Totals and average rates	931,449	1,121,079	4,575	153	4,798	162	4,165	135	4,063	131	4,003	136	3,697	123
AUSTRIA-HUNGARY.														
Budapest	734,165	880,371	3,825	166	3,358	143	3,439	151	3,128	136	3,218	147	3,434	156
Lemberg	159,877	206,113	1,118	186	1,071	183	970	160	897	147	887	152	1,158	195
Vienna	1,674,957	2,031,498	10,084	194	8,975	171	9,635	184	8,850	168	8,934	176	9,685	188
Totals and average rates	2,568,999	3,117,982	15,027	182	13,404	166	14,044	165	12,875	150	13,039	158	14,277	180
RUSSIA.														
Moscow	988,614	1,481,200	13,505	387	13,146	370	12,472	344	12,924	343	12,961	338	12,963	325
St. Petersburg	1,132,677	1,907,708	9,529	269	9,198	251	9,027	243	9,905	250	9,981	251	10,711	260
Warsaw	638,208	781,179	4,499	185	4,513	186	3,781	144	4,522	175	4,464	177	3,919	138
Totals and average rates	2,759,499	3,170,087	27,533	280	26,857	269	25,280	244	27,351	256	27,406	255	27,593	241

A tabular study of the annual number and ratios per 1,000 living births in the preceding year of the deaths under 1 year in leading European cities for the decade, 1900–1909, inclusive, and an analysis of the total numbers and average ratios and their decrease or increase by the quinquennial periods, 1900–1904, and 1905–1909—Continued.

Cities.	Number of deaths under 1 year, and rates per 1,000 living births in the preceding year.															
	1906		1907		1908		1909		First half of decade, 1900–1909.		Second half of decade, 1900–1909.		Decrease or increase in second half.			
													Decrease.		Increase.	
	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Total number.	Average rate.	Total number.	Average rate.	Number.	Rate.	Number.	Rate.
GERMANY.																
Aachen	916	214	853	187	722	167	750	172	4,681	206	4,165	190	516	16	.....	.....
Barmen	548	117	481	105	435	94	403	92	3,338	144	2,539	110	799	34	.....	.....
Berlin	9,111	184	8,295	161	8,250	162	7,178	146	51,250	208	43,004	172	8,246	36	.....	.....
Bochum	847	167	842	158	979	167	773	127	2,764	173	4,202	154	.....	19	1,438	.....
Bremen	1,065	171	981	148	969	144	807	118	4,568	174	4,932	151	.....	23	364	.....
Breslau	3,132	218	3,294	224	2,871	203	3,068	207	18,001	257	15,981	221	2,020	36	.....	.....
Cassel	515	161	455	112	456	113	437	106	2,346	154	2,293	126	53	28	.....	.....
Charlottenburg	768	154	696	128	716	129	690	123	4,052	173	3,648	140	404	33	.....	.....
Chemnitz	2,157	263	2,055	243	2,081	241	1,742	197	12,521	328	10,379	246	2,142	82	.....	.....
Cologne	3,434	226	3,023	195	3,031	191	2,550	163	16,731	233	15,302	198	1,429	35	.....	.....
Crefeld	435	159	388	143	451	167	418	132	2,505	167	2,076	148	429	19	.....	.....
Danzig	1,095	210	1,022	190	1,073	214	1,060	201	6,419	257	5,538	212	881	45	.....	.....
Dortmund	1,460	193	1,364	174	1,390	172	1,242	161	5,695	179	6,736	176	.....	3	1,041	.....
Dresden	2,396	166	2,085	146	2,030	148	1,770	133	13,117	196	11,317	159	1,800	37	.....	.....
Dusseldorf	1,695	195	1,282	148	1,356	155	1,449	167	8,077	197	7,440	172	637	25	.....	.....
Elberfeld	628	126	558	112	551	112	459	97	4,350	169	2,995	120	1,355	49	.....	.....
Essen	1,657	179	1,295	138	1,399	150	1,202	128	6,328	168	6,942	153	.....	15	614	.....
Frankfort on the Main	1,415	155	1,278	131	1,327	139	1,144	120	6,986	170	6,741	143	245	27	.....	.....
Hamburg	3,509	172	2,950	135	3,458	163	3,067	138	17,525	174	16,526	157	999	17	.....	.....
Hanover	957	160	931	157	890	147	872	126	6,000	173	4,638	149	1,362	24	.....	.....
Königsberg	1,293	226	1,660	244	1,289	193	1,206	173	6,604	229	6,862	216	.....	13	258	.....
Leipzig	2,831	193	2,473	168	2,457	174	2,335	169	17,407	230	13,451	186	3,956	44	.....	.....
Magdeburg	1,412	229	1,406	214	1,362	210	1,138	179	8,149	235	6,823	214	1,326	21	.....	.....
Munich	3,095	191	3,057	193	2,906	194	2,757	183	21,981	252	15,474	196	6,507	56	.....	.....
Nürnberg	2,362	233	2,141	207	2,091	204	1,854	185	12,123	255	11,019	216	2,104	39	.....	.....
Plauen	843	216	769	197	778	206	642	162	3,534	240	3,829	199	.....	41	295	.....
Posen	1,013	203	1,020	192	1,067	207	1,051	197	5,191	249	5,449	212	.....	37	258	.....
Stettin	1,718	240	1,474	207	1,642	242	1,319	[a] 209	11,400	293	8,040	230	3,360	63	.....	.....
Strassburg	909	193	796	168	786	171	765	164	5,066	221	4,257	181	809	40	.....	.....

Stuttgart	1,330	188	1,121	157	1,232	173	1,077	147	5,587	210	6,173	184	.....	26	586	.....
Totals and average rates	54,546	190	50,045	169	50,045	172	45,225	154	295,296	210	258,771	177	41,379	33	4,854	.....
FRANCE.																
Bordeaux	411	93	519	119	432	101	490	115	2,943	117	2,322	106	621	11	.....	.....
Le Havre	686	191	617	173	548	150	521	150	3,679	186	3,023	168	656	18	.....	.....
Lille	1,162	213	1,047	193	995	193	924	178	6,611	216	5,303	198	1,308	18	.....	.....
Lyon	1,074	128	949	115	908	114	754	89	5,488	127	4,631	112	857	15	.....	.....
Nancy	391	167	350	138	454	187	443	177	1,894	163	2,011	164	.....	.....	117	1
Paris	5,542	108	5,326	104	5,214	104	4,721	94	30,870	111	26,470	103	4,400	8	.....	.....
St. Etienne	358	124	327	113	333	115	289	94	1,903	119	1,672	113	231	6	.....	.....
Totals and average rates	9,624	146	9,135	136	8,884	138	8,142	128	53,388	148	45,432	138	8,073	10	117	1
GREAT BRITAIN.																
Belfast	1,635	143	1,523	133	1,692	150	1,510	134	8,350	149	7,910	139	440	10	.....	.....
Birmingham	2,686	170	2,300	144	2,339	150	2,030	126	15,167	178	11,806	147	3,361	31	.....	.....
Bradford	903	149	713	120	860	150	643	107	4,953	156	3,992	133	961	23	.....	.....
Bristol	1,196	123	900	96	1,102	123	860	98	5,866	128	5,240	114	626	14	.....	.....
Derby	354	114	377	122	359	114	391	118	2,254	147	1,948	122	306	25	.....	.....
Dublin	1,628	146	1,714	154	1,683	154	1,605	140	8,829	166	8,232	147	597	19	.....	.....
Edinburgh	899	116	946	124	913	122	880	117	5,257	130	4,668	122	589	8	.....	.....
Glasgow	3,223	133	3,116	127	3,284	137	3,073	128	17,782	145	15,890	131	1,892	14	.....	.....
Hull	1,254	163	968	124	1,215	158	916	112	6,611	168	5,537	142	1,074	26	.....	.....
Liverpool	4,137	170	3,383	140	3,355	142	3,377	141	20,698	179	17,962	149	2,736	30	.....	.....
London	16,307	131	14,114	116	13,943	113	12,582	102	94,198	144	73,270	118	20,928	26	.....	.....
Portsmouth	701	135	714	122	607	105	556	91	3,840	148	3,333	118	507	30	.....	.....
Totals and average rates	34,923	141	30,768	127	31,352	135	28,423	118	193,805	153	159,788	132	34,017	21	.....	.....
ITALY.																
Bologna	445	144	404	126	453	139	427	128	2,612	164	2,169	135	443	29	.....	.....
Genoa	863	148	1,026	165	935	153	1,026	168	4,681	165	4,825	159	.....	6	144	.....
Milan	1,887	140	1,896	138	1,786	125	1,931	124	9,670	151	9,446	134	224	17	.....	.....
Naples	2,575	155	2,484	145	2,601	156	2,532	142	12,944	154	12,790	151	154	3	.....	.....
Rome	1,835	151	1,670	133	1,679	131	1,831	134	7,733	131	8,863	140	.....	.....	1,130	9
Turin	989	144	1,039	146	1,043	142	948	122	5,474	152	4,931	136	543	16	.....	.....
Totals and average rates	8,594	147	8,519	142	8,497	141	8,695	136	43,114	153	43,024	143	1,364	a 10	1,274	9
BELGIUM.																
Antwerp	1,305	183	1,144	167	1,177	166	1,060	157	6,706	175	5,906	168	800	7	.....	.....
Brussels	711	195	616	169	711	203	640	197	3,897	174	3,323	186	574	.....	.....	12
Ghent	929	246	759	208	895	254	589	170	5,502	251	4,028	219	1,474	32	.....	.....
Liege	492	157	388	124	420	141	348	122	2,348	132	2,055	135	293	.....	.....	3
Totals and average rates	3,437	195	2,907	167	3,203	191	2,637	162	18,453	183	15,312	177	3,141	a 6	.....	15

a Ratio to living births in same year.

A tabular study of the annual number and ratios per 1,000 living births in the preceding year of the deaths under 1 year in 68 leading European cities for the decade, 1900–1909, inclusive, and an analysis of the total numbers and average ratios and their decrease and increase by the quinquennial periods, 1900–1904, and 1905–1909—Continued.

Cities.	Number of deaths under 1 year, and rates per 1,000 living births in the preceding year.															
	1906		1907		1908		1909		First half of decade, 1900–1909.		Second half of decade, 1900–1909.		Decrease or increase in second half.			
													Decrease.		Increase.	
	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Total number.	Average rate.	Total number.	Average rate.	Number.	Rate.	Number.	Rate.
THE NETHERLANDS.																
Amsterdam	1,542	104	1,290	89	1,314	91	1,111	80	9,833	128	6,877	95	2,956	33	.....	.....
Rotterdam	1,584	126	1,378	107	1,454	109	1,152	87	9,211	153	7,174	111	2,037	42	.....	.....
Utrecht	429	122	355	105	385	116	318	97	2,560	150	1,958	115	602	35	.....	.....
Totals and average rates	3,555	117	3,023	100	3,153	105	2,581	88	21,604	144	16,009	107	5,595	37	.....	.....
AUSTRIA-HUNGARY.																
Budapest	3,063	143	3,300	154	3,208	151	3,515	162	16,968	149	16,520	153	448	.....	.....	4
Lemberg	880	148	885	146	899	154	973	162	4,943	166	4,795	161	148	5	.....	.....
Vienna	8,691	168	8,320	163	8,638	173	7,822	164	46,478	179	43,156	171	3,322	8	.....	.....
Totals and average rates	12,634	153	12,505	154	12,745	159	12,310	163	68,389	165	64,471	162	3,918	c 3	.....	4
RUSSIA.																
Moscow	14,099	349	15,460	353	16,128	328	16,539	326	65,008	356	75,189	336	.....	20	10,181	.....
St. Petersburg	11,038	266	11,486	266	12,426	269	11,044	250	47,640	253	56,705	262	.....	.....	9,065	9
Warsaw	4,410	180	4,066	161	4,112	194	4,250	183	21,779	173	30,757	171	1,022	2	.....	.....
Totals and average rates	29,547	265	31,012	260	32,666	264	31,833	253	134,427	261	152,651	257	1,022	a 4	b 18,224	9

a Net decrease. b Net increase.

RECAPITULATION.

National groups of cities.	Populations at beginning and end of decade, 1900–1910.		Number of deaths under 1 year, and rates per 1,000 living births in the preceding year.											
			1900		1901		1902		1903		1904		1905	
	1900	1910	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.
30 cities of the German Empire	8,600,708	11,105,235	65,464	240	62,669	221	52,032	182	56,852	201	58,279	207	58,910	203
7 cities of France	4,019,815	4,296,155	11,687	163	10,989	150	10,743	146	9,716	136	10,253	146	9,647	140
12 cities of Great Britain	8,685,364	8,966,965	41,481	162	39,812	160	37,148	147	35,525	139	39,839	158	34,322	139
6 cities of Italy	2,240,158	2,733,491	8,575	161	8,997	164	8,383	146	8,561	147	8,598	146	8,719	147
4 cities of Belgium	1,148,736	1,326,363	4,102	197	3,925	186	3,407	166	3,595	183	3,424	182	3,128	171
3 cities of the Netherlands	931,449	1,121,079	4,575	153	4,798	162	4,165	135	4,063	131	4,003	136	3,697	123
3 cities of Austria-Hungary	2,568,999	3,117,982	15,027	182	13,404	166	14,044	165	12,875	150	13,039	158	14,277	180
3 cities of Russia	2,759,499	3,170,087	27,533	280	26,857	269	25,280	244	27,351	256	27,406	255	27,593	241
Grand totals for 68 leading cities of Europe	30,954,728	35,837,357	178,444	192	171,451	185	155,202	166	158,538	168	164,841	174	160,293	168

National groups of cities.	Number of deaths under 1 year, and rates per 1,000 living births in the preceding year—continued.								Aggregate numbers and average rates of infant deaths in 5-year periods.				Decrease or increase in latter period.	
	1906		1907		1908		1909		Number.		Average rates.			
	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	1900–4	1905–9	1900–4	1905–9	Number.	Rate.
30 cities of the German Empire	54,546	190	50,045	169	50,045	172	45,225	154	295,296	258,771	210	177	36,525	33
7 cities of France	9,624	146	9,135	136	8,884	138	8,142	128	53,388	45,432	148	138	7,956	10
12 cities of Great Britain	34,923	141	30,768	127	31,352	135	28,423	118	193,805	159,788	153	132	34,017	21
6 cities of Italy	8,594	147	8,519	142	8,497	141	8,695	136	43,114	43,024	153	143	90	10
4 cities of Belgium	3,437	195	2,907	167	3,203	191	2,637	162	18,453	15,312	183	177	3,141	6
3 cities of the Netherlands	3,555	117	3,023	100	3,153	105	2,581	88	21,604	16,009	144	107	5,595	37
3 cities of Austria-Hungary	12,634	153	12,505	154	12,745	159	12,310	163	68,389	64,471	165	162	3,918	3
3 cities of Russia	29,547	265	31,012	260	32,666	264	31,833	253	134,427	152,651	261	257	b 18,224	4
Grand totals for 68 leading cities of Europe	156,860	169	147,914	157	150,545	163	139,846	150	828,476	755,458	177	162	a 73,018	15

a Net decrease.

b Net increase.

STATISTICAL COMPARISON OF THE MORTALITY OF BREAST-FED AND BOTTLE-FED INFANTS.

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The great importance of breast feeding has long been known, but so far the subject has failed to secure its proper share of attention.

Advertisements of infant foods and an abundance of medical literature on scientific feeding of infants have lulled both mothers and physicians into a false sense of security in the practice of artificial feeding. The fearful loss of infant life is so spread out over the entire country that the individual physician does not appreciate his own responsibility, though a conservative estimate ascribes a full third of all infant deaths to unnecessary bottle feeding.

During the Siege of Paris 1870–71, when the milk supply failed, the Parisian women nursed their children, and the infant mortality rate fell from 330 to 170 per thousand births.[1]

A similar fall in the infant-mortality rate was seen "during the Lancashire cotton famine, when mothers were not at work in the mills."[2]

An analysis of 13,952 children born in Baudeloque's clinic showed an infant mortality of 14 per cent for the breast fed, 31 per cent for those who were bottle fed by their own mothers, and 50 per cent for those who were bottle fed by strangers.[3]

And so throughout the civilized world, wherever a large percentage of mothers suckle their children, the infant-mortality rate is low. Norway and Sweden are examples, with low rates, respectively, of 74 and 85 per 1,000 births.[4]

But the objection has been made that some mothers are unable to nurse their children.

Dr. L. Emmett Holt estimated[5] that not over 25 per cent of the well to do and cultured of New York City who had earnestly and intelligently attempted to nurse had succeeded in doing so for as long as three months. At the other extreme are the figures of Mme. Dluski[6] who, in the maternity department of Prof. Pinard in Paris, found 99 per cent able to nurse their children; and between these extremes are found many estimates, as 66 per cent for France, 90 per cent for parts of New York City,[7] 96 per cent for Munich, and so on.[8]

In view of these widely different estimates, in view of the fact that mothers in Greenland, Turkey, and Japan almost always nurse their children, and in view of the fact that wherever the propaganda has gone forth that mothers ought to nurse their children, greater numbers have been able to do so, is it not reasonable to believe that almost all mothers, if properly cared for and encouraged, will be able to nurse their young? Such is the belief of Dr. Jacobi,[8] who recently said:

"One hundred per cent of our women can be made to nurse, even the 'flower and fashion' of the land." If such an opinion is too optimistic, certain it is that with proper care and encouragement many more mothers will be able to nurse their children than do so to-day.

For in some places the percentage of mothers who actually suckle their children is extremely low; in Berlin 55 per cent of mothers nursed in 1885 and but 31.4 per cent in 1900, while in Leipzig 45 per cent of mothers either do not nurse at all or less than eight days, and only 27 per cent nurse their children six months. On the other hand the possibility of increasing these percentages is well shown by the figures from the Heidelberg clinic, where in three years the percentage of mothers nursing their children increased from 64 to 86 per cent.[9]

Investigation of breast and bottle feeding in Boston and its bearing upon the infant mortality of the city was recently undertaken by the Boston health department.[10]

To find the percentage of babies that were breast fed about 900 letters were sent to mothers who had births recorded within the past year. Care was taken to select proportionate numbers of babies of various age periods, namely, 2 weeks to 1 month, 1 to 3 months, 3 to 6 months, 6 to 9 months, and 9 to 12 months, and to select proportionate numbers of babies from the various wards and from the various mother nativities, the number of births in 1910 in the various wards of various mother nativities being taken as the basis for these proportions. Aside from obtaining the proportionate numbers of babies in the way just indicated, care was taken not to select these babies in any way, but to take them at random from the birth returns furnished by the registry department. The circular sent to each mother was as follows:

DEAR MADAM: To assist the board of health in its campaign to save the babies of Boston, will you please answer the following questions regarding your child and return this slip at once in the enclosed envelope:

Is this child breast fed? (Answer "Yes" or "No.")
How long was it breast fed?
Is this child bottle fed? (Answer "Yes" or "No.")
How long has it been bottle fed?
If bottle fed, what food has been used?

Replies were received promptly from over half of the mothers addressed, and an additional 200 replies were obtained through the board of health nurses, who went to the homes for the information.

Table I gives the results of this investigation—the number of replies received for babies of various ages and mother nativities and the percentages of breast and bottle fed babies.

The number of replies was 736, of which 533, or 72.4 per cent, were breast fed, and 203, or 27.6 per cent, were bottle fed. But the information thus obtained was only for living children. To deter-

mine what proportion of all babies were bottle or breast fed, it was necessary to add a proportionate number of the deaths of 1911. These necessary additions are given in Table II. Adding the figures in each square of Table II to the figures in the corresponding square of Table I, totals may be obtained which show the relative proportions of breast and bottle fed babies in Boston. The corrected percentages shown in Table II were thus obtained. At various places in the table there appear higher percentages of breast feeding for the older babies than for the younger. This, of course, is an error due to too few replies and would be rectified if answers from all the mothers of 1911 could be tabulated. But the evidence furnished by these 736 replies is very striking and may be used for present calculations.

It is estimated that 68 per cent of all Boston babies between the ages of 2 weeks and 1 year are breast fed; that of Boston babies with Canadian mothers, only 51 per cent are breast fed; of those with native mothers, 59 per cent; of those with Irish mothers, 73 per cent; of those with Russian and Polish mothers, 79 per cent; and of those with Italian mothers, 83 per cent. The replies from mothers born in Scotland, England, and Wales, Germany, and Scandinavia were too few to warrant any estimates for their babies.

Table III gives for 1911 the total mortality of infants by age, by mother nativity, and by feeding (for infants over 2 weeks of age). Seventy-four per cent of the deaths of these infants were among bottle-fed babies, and those between the ages of 1 and 3 months show the highest mortality, especially those having mothers born in the United States.

Now, if 74 per cent of infant deaths above the age of 2 weeks are among bottle-fed babies, and only 32 per cent of babies over 2 weeks are bottle fed, then of such infants the bottle fed is six times as likely to die as the breast fed.

Table IV gives for 1911 the mortality of infants by month, by age, and by feeding (for infants over 2 weeks of age). During July and August tne number of deaths among the breast-fed infants was only slightly increased, while among the bottle-fed infants the mortality was trebled.

An analysis of these deaths by cause reveals many interesting facts:

Measles had a total of 17 deaths between 2 weeks and 1 year, 9 breast fed and 8 bottle fed. Six of the breast-fed children were Italians, among whom measles always has a high mortality.

Whooping cough had a total of 52 deaths, 23 breast fed and 29 bottle fed.

Using the deaths among the breast-fed children of each nationality as the standard, there were 40 per cent too many deaths among the

children of both native mothers and Irish mothers, and 35 per cent too many deaths in the entire city.

Diphtheria had a total of 20 deaths, all except 3 Italians bottle fed.

Pulmonary tuberculosis had a total of 16 deaths with only 1 breast fed.

These figures regarding deaths from communicable diseases indicate that the bottle-fed baby either is more susceptible to these diseases or does not possess as much stamina as the breast-fed baby to effectually combat them. The same fact is apparent also in septicemia, which caused 5 deaths, all bottle fed, and in diseases of the ear, which caused 6 deaths, all bottle fed.

Broncho-pneumonia and pneumonia had a total of 309 deaths between 2 weeks and 1 year with 184 bottle fed. Using the deaths of breast-fed babies as the standard, breast feeding would have diminished these deaths above 2 weeks of age among the children of native mothers 51 per cent, among children of Irish mothers, 53 per cent; among children of Canadian mothers 43 per cent, among children of Italian mothers 28 per cent, among children of Russian and Polish mothers 37 per cent, and for the whole city, 40 per cent.

But it is especially in the study of diarrhea and enteritis that the terrible effects of bottle feeding are revealed. There were in Boston in 1911, between the ages of 2 weeks and 1 year, 621 deaths due to this cause, 534 of which were bottle fed. From this cause of death in the age period 2 weeks to 1 month the ratio of deaths of bottle-fed to breast-fed babies was 4 to 1; in the period of 1 to 3 months the ratio was 9 to 1; 3 to 6 months, 7 to 1; 6 to 9 months, 8 to 1; 9 to 12 months, 3 to 1; and for all children between 2 weeks and 1 year, 6 to 1. While among those of native mothers the ratio was 13 to 1; among those of Irish mothers the ratio was 7 to 1; of Canadian mothers, 12 to 1; of Russian and Polish mothers, 3 to 1; of Italian mothers, 3 to 2.

Perhaps the rates in Table V show the comparisons most clearly: Of each 1,000 breast-fed infants over 2 weeks old of each mother nativity there died 30 Americans, 24 Irish, 37 Canadians, 56 Italians, and 31 Russians and Poles; while of each 1,000 bottle-fed infants over 2 weeks old of each mother nativity there died 224 Americans, 246 Irish, 156 Canadians, 251 Italians, and 200 Russians and Poles. Of each 1,000 breast-fed infants over 2 weeks old of each mother nativity, diarrhea and enteritis killed 5 Americans, 6 Irish, 6 Canadians, 14 Italians, and 8 Russians and Poles; while of each 1,000 bottle-fed infants over 2 weeks of each mother nativity, diarrhea and enteritis killed 105 Americans, 104 Irish, 73 Canadians, 104 Italians, and 93 Russians and Poles.

These estimated rates measure the possible reduction in infant mortality if all babies could be breast fed.

Of infants reaching the age of 2 weeks, 1 in 5 dies before a year old if bottle fed, while if breast fed only 1 in 30 fails to reach the 1-year mark. This means that the deaths of these infants would be 60 per cent less if all could be breast fed.

The actual number of infant deaths in Boston last year was 2,248. Breast feeding would have saved nearly a thousand of these children and the rate instead of 127 per thousand births would have been 71.

Such a saving of infant life is not a mere fancy. The reduction of the infant mortality rate from 127 to 71 is entirely within the range of possibilities.

New Zealand in 1909 had a rate of 62 and South Australia for the same year a rate of 61.[11]

Surely mothers should suckle their children as God intended.

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[1] Brehmer: Wschr. f. Sauglings fürsorge. Leipz. 1907, I 209–225.
[2] Devine: Hospital, London 1906–7, XLI, 137–142.
[3] Jaschke: Monatschr. f. Geburtsh. u. Gynäk. 1908; 172–207.
[4] Victorian Year Book 1909–10, 133.
[5] Quoted in St. Louis Med. Rev. 1910, H. S. IV, 324–329.
[6] Thèse de Paris, 1894; quoted by Griffith: Bull. Am. Acad. M. 1910, XI, 151–160.
[7] Hermann: Pediatrics N. Y. 1909, XXI, 425–429.
[8] Jacobi: Jour. Am. Med. Ass. June 8, 1912; 1744.
[9] Jachke: Monatchr. f. Geburtsh. Gynäk. 1908; 172–207.
[10] Davis: Boston Med. and Surg. Jour., CLXVI, 242–244.
[11] Victorian Year Book, 1909–10, 132.

Seven Tables About Boston Babies.

Table I.—*Living babies—Breast or bottle fed.*

Mother nativity.	Total replies.													Percentage breast fed.
	2 weeks to 1 year.	2 weeks to 1 year.		2 weeks to 1 month.		1 to 3 months.		3 to 6 months		6 to 9 months.		9 to 12 months.		
		Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	
United States	272	174	98	44	8	33	23	42	19	24	29	31	19	64
Ireland	120	93	27	17	1	24	6	23	8	16	5	13	7	77
England, Scotland, and Wales	20	15	5	1	.....	3	1	4	1	3	2	4	1	.....
Germany	2	1	1	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....
Canada	69	38	31	5	1	8	7	8	9	8	8	9	6	55
Scandinavia	10	8	2	1	.....	1	1	2	.....	3	1	1	.....	.....
Italy	123	106	17	24	2	23	4	23	2	18	2	18	7	86
Russia and Poland	120	98	22	20	2	21	7	21	6	17	6	19	1	82
Totals	736	533	203	112	14	113	49	124	46	89	53	95	41	72
Percentages	.....	72	28	89	11	70	30	73	27	63	37	70	30	.....

TABLE II.—*Death additions to Table I necessary to obtain corrected percentages of breast and bottle fed babies.*

Mother nativity.	2 weeks to 1 year.		2 weeks to 1 month.		1 to 3 months.		3 to 6 months.		6 to 9 months.		9 to 12 months.	
	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.
United States	5	27	1	3	1	9	1	7	1	4	1	4
Ireland	3	9	.....	1	1	2	1	2	.....	2	1	2
England, Scotland, and Wales	1	1	.....	.....	.....	.....	1	1	.....	.....	.....	.....
Canada	2	7	.....	1	1	2	1	2	.....	2	.....	.....
Scandinavia	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Italy	6	6	1	1	1	1	1	1	2	2	1	1
Russia and Poland	3	5	1	.....	1	1	.....	2	1	1	.....	1
Totals	20	56	3	6	5	16	5	15	4	11	3	8
Corrected percentages for the various age periods	68	32	85	15	64	36	68	32	59	41	67	33

Corrected percentages of breast-fed infants of various mother nativities.

Children of mothers born in the United States	59
Children of mothers born in Ireland	73
Children of mothers born in Canada	51
Children of mothers born in Italy	83
Children of mothers born in Russia and Poland	79

TABLE III.—*1911 mortality of infants by age, by mother nativity, and by feeding (for infants over 2 weeks of age).*

Mother nativity.	Total deaths.													Per cent of deaths 2 weeks to 1 year breast fed.
	Under 1 year.	2 weeks to 1 year.		2 weeks to 1 month.		1 to 3 months.		3 to 6 months.		6 to 9 months.		9 to 12 months.		
		Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	
United States	928	106	546	26	58	20	172	31	145	13	93	16	78	16
Ireland	346	48	179	7	20	16	47	8	53	8	29	9	30	21
England, Scotland, and Wales	61	13	25	1	1	4	7	5	10	1	4	2	3	34
Germany	12	3	6	1	.....	.....	2	.....	1	1	.....	1	3	33
Canada	232	32	128	5	10	7	40	7	33	7	35	6	10	20
Scandinavia	30	5	15	.....	3	2	4	3	4	.....	3	.....	1	25
Italy	293	124	113	13	13	26	22	21	27	37	32	27	19	52
Russia and Poland	230	60	101	11	8	17	21	11	27	13	25	8	20	37
Other countries	87	21	51	.....	1	6	12	5	10	6	18	4	10	29
Unknown	29	1	25	.....	1	.....	13	1	3	.....	3	.....	5	4
Totals	2,248	413	1,189	64	115	98	340	92	313	86	242	73	179	26
Percentages	.....	26	74	36	64	22	78	23	77	26	74	29	71	.....

NOTE.—There were 3 deaths over 2 weeks where method of feeding was not known.

TABLE IV.—*1911 mortality of infants by month, by age, and by feeding (for infants over 2 weeks of age).*

Month.	Total deaths.												
	Under 1 year.	2 weeks to 1 year.		2 weeks to 1 month.		1 to 3 months.		3 to 6 months.		6 to 9 months.		9 to 12 months.	
		Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.	Breast.	Bottle.
January	162	34	65	7	6	10	21	8	18	5	11	4	9
February	175	49	65	8	5	13	17	7	16	13	13	8	14
March	196	41	101	10	8	11	35	7	22	7	27	6	9
April	191	38	102	8	10	9	28	10	23	7	22	4	19
May	181	34	85	7	15	4	22	11	20	5	13	7	15
June	129	21	61	4	8	6	19	3	10	6	14	2	10
July	280	39	184	3	10	8	46	10	46	10	49	8	33
August	260	40	181	5	13	6	41	12	64	8	38	9	25
September	225	40	138	2	16	7	39	10	40	10	23	11	20
October	172	26	86	1	5	9	27	6	28	3	13	7	13
November	139	24	62	3	9	9	24	3	12	5	10	4	7
December	138	27	59	6	10	6	21	5	14	7	9	3	5
Total	2,248	413	1,189	64	115	98	340	92	313	86	242	73	179

TABLE V.—*Infant mortality rates for 1911 (using births of 1910).*

	Deaths per 1,000 births.	Deaths per 1,000 aged 2 weeks to 1 year.	Death rates per 1,000 of each mother nativity.											
			Breast-fed children aged 2 weeks to 1 year.						Bottle-fed children aged 2 weeks to 1 year.					
			All mother nativities.	American.	Irish.	Canadian.	Italian.	Russian and Polish.	All mother nativities.	American.	Irish.	Canadian.	Italian.	Russian and Polish.
All causes	127	94	36	30	24	37	56	31	218	224	246	156	251	200
Communicable diseases (Nos. 1, 6, 7, 8, 9, 28–35, 61*a*, 61*b*, International Classification)	9	9	4	4	5	6	6	2	19	16	26	16	18	24
Broncho-pneumonia	11	11	6	5	4	4	14	4	21	21	25	10	38	61
Pneumonia	7	7	5	4	4	4	7	5	13	9	11	9	29	20
Diarrhea and enteritis	35	36	8	5	6	6	14	8	98	105	104	73	104	93
Congenital debility, icterus and sclerema and other causes peculiar to early infancy (Nos. 151 and 152, International Classification)	36	9	3	3	2	2	3	3	22	21	30	18	22	22

TABLE VI.—*Actual death rates and estimated death rates if all children had been breast fed.*

	Mother nativity.					
	United States.	Ireland.	Canada.	Italy.	Russia and Poland.	Total for Boston.
Births, 1910	6,226	2,816	1,747	2,705	2,479	17,670
Deaths under 1 year, 1911	928	346	232	293	230	2,248
Rate per 1,000 births (using the 1910 births)	149	123	133	108	93	127
Percentage of children between 2 weeks and 1 year, breast fed (estimated)	59	73	51	83	79	68
Deaths, 1911, of children between 2 weeks and 1 year	654	227	160	237	162	1,605
Percentage of deaths between 2 weeks and 1 year, breast fed	16	21	20	52	37	26
Estimated total infant deaths, 1911, if all above age of 2 weeks had been breast fed	455	185	135	206	145	1,253
Lives saved if all above age of 2 weeks had been breast fed	473	161	97	87	85	995
Estimated death rate if all above 2 weeks had been breast fed	73	66	77	76	58	71
Estimated reduction in death rate if all above 2 weeks had been breast fed	76	57	56	32	35	56

INFANT MORTALITY IN NEW YORK CITY.

Dr. William H. Guilfoy, Registrar of Records, Department of Health, New York City.

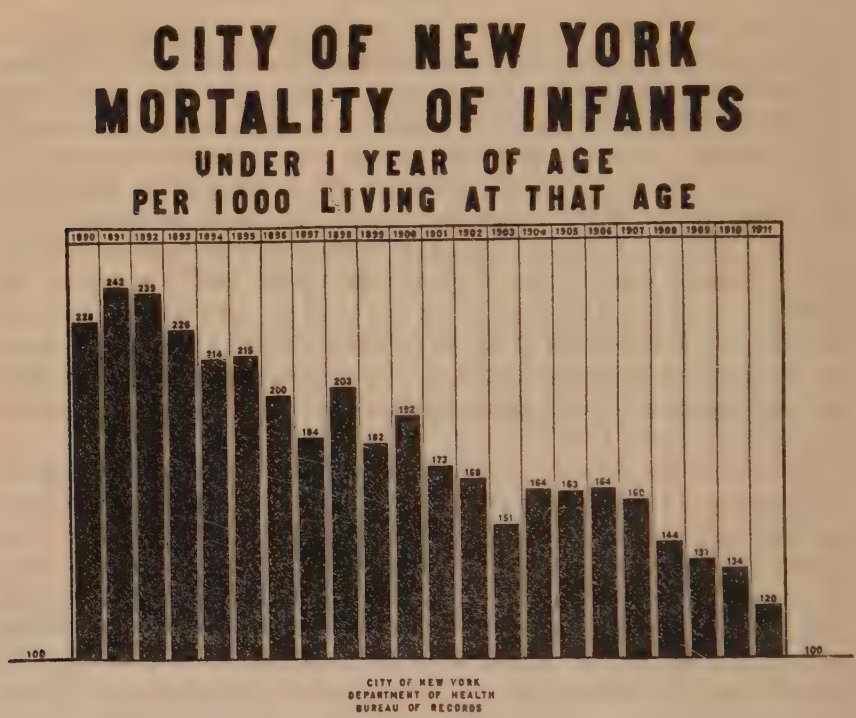
During the past five years there were reported 80,890 deaths of infants under 1 year of age, a tremendous sacrifice upon the altars of parental ignorance, sin, and poverty. The work-away, don't-care world scarcely stops to give a thought to the question of life saving; to it, money making and spending are more pleasant thoughts to harbor, and in consequence the task of conservation of the race must be taken up by the Government—municipal, state, or federal.

The measure of infant mortality throughout the civilized world is the number that die out of every 1,000 born, and it is deplorable that so few of our American cities and none of our States have sufficiently complete returns of births recorded therein to serve as a basis of comparative mortality; it is only within the past five years that the completeness of the returns made it possible to measure the infant mortality of New York City.

In 1911 there were 134,532 births reported, and 15,013 deaths of infants under 1 year—that is, 112 infants died out of every 1,000 born during the year, a rate based upon a reporting of 95 per cent of the births that actually occurred; compared with the rate of 130 in England and Wales (urban and suburban) in 1911, the result is not to the discredit of the city; only 2 out of 38 German cities of over 100,000 population showed an infant mortality slightly lower than that of New York, the remaining 36 showing rates considerably higher; 4 of the principal cities of Austro-Hungary and 6 of the leading cities of France were likewise chargeable with a greater infant mortality; Paris showed a lesser mortality but by reason of the exclusion of infants deceased before the third day of life and the placing of many infants to nurse outside of the city limits whose deaths are not charged to the city's mortality, a comparison with New York is obviously unfair. The rate for London in 1910 was 104, which is slightly less than the actual mortality in New York in 1911, if allowance be made for the 5 per cent of births not recorded.

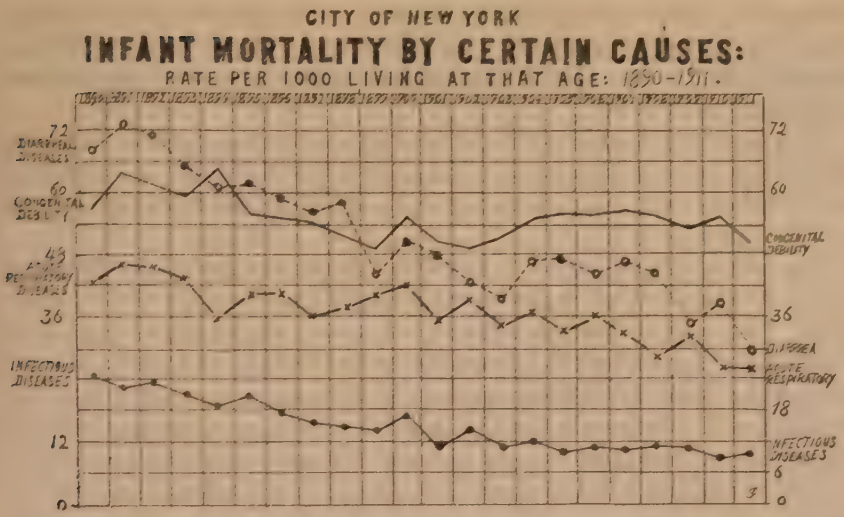
In this city out of every 1,000 deaths under 1 year of age from all causes 325 took place before the completion of the first month of life, 505 before the age of 3 months was reached, and almost 700 before the age of 6 months; out of every 1,000 deaths reported from diarrheal causes 85 took place before the first month, 300 before 3 months, and 600 before 6 months.

The decrease in infant mortality during the past twenty years in this city is shown by a glance at the accompanying chart showing the rate per 1,000 infants living under 1 year of age; in 1891 out of every 1,000 infants living 228 died, while in 1911 only 128 died, a reduction of 44 per cent; the first quinquennium mortality was 229 per 1,000 and the last 146, a decrease of 36 per cent.



The causes of death among infants may be divided into four chief groups; first and most numerous, the congenital diseases, which represent 30 per cent of the total mortality; next the diarrheal diseases, 27 per cent; then the acute respiratory diseases, 23 per cent; and contagious and infectious diseases 8 per cent, the four together totaling almost 90 per cent of the entire mortality.

The second chart shows the mortality arranged according to these prominent groups of diseases. The line marked "infectious diseases" shows the mortality from measles, scarlet fever, whooping cough, diphtheria and croup, and tuberculosis other than pulmonary; a comparison of the mortality from this group during the first quinquennium with that of the last shows a reduction of 55 per cent.



The line marked "acute respiratory diseases" shows the mortality from acute bronchitis and pneumonia, and comparing the mortality of the first with the last quinquennium on the chart shows a reduction of 32 per cent.

The solid line indicates the mortality from the so-called congenital diseases, such as prematurity, inanition, marasmus, malformations, atrophy, delibility, inability to nurse, etc., and a comparison of the first 11 years' mortality with that of the second shows a decrease of 6 per cent.

The question might with propriety be asked, What part has sanitary supervision played in this reduction of mortality and to what extent has its influence accounted for the gratifying results depicted?

The top line represents the mortality from diarrheal diseases, and quinquennial comparisons similar to the above show a decrease in the rate of 43 per cent.

There is no doubt that official action has minimized to a great extent the mortality from the infectious and contagious diseases, and it might be claimed, without fear of contradiction, that the improvement in this direction has been the result of sanitary intervention. It is true that measles, scarlet fever, diphtheria, and tuberculosis in infants at no time represented more than 10 per cent of the total mortality of infants, still the fact remains that every infant saved from death from these causes will represent, not the preservation of the life of a weakling, but that of a strong, healthy, viable unit of the population.

As regards the mortality from the acute respiratory diseases, it is admitted that no official action has been taken specifically against the

inroads of these very prevalent diseases, only indirectly by controlling the mortality from the contagious and infectious diseases has there resulted a decreased mortality from the accompanying diseases, especially pneumonia.

The mortality from diarrheal diseases has shown a gradual decrease extending over a series of years, but more marked within the past three years, when a concentration of official and philanthropical effort was put in operation.

The initial official action in an effort to reduce infant mortality was taken 40 years ago, when the board of health appointed about 30 physicians, who were called the summer corps and whose duties consisted in traveling from house to house seeking sick babies, and finding them, prescribing and furnishing medicines without cost. This plan of treating sick infants was kept up yearly, wholly with the end in view of trying to cure and not to prevent disease. Very little, if any, attempt was made to prevent the disease from taking hold or to educate the parent as to the necessity of vigilant care of the infant and its food supply. It must be admitted that the necessity of instruction was not as pressing 20 years ago as it has been since the vast immigration from south and west continental Europe with its tremendous numbers of uneducated parents. The first individual to second the efforts of the department of health was Mr. Nathan Strauss, who in 1892 established booths for the sale and dispensing of pasteurized milk. The reduction in the infant mortality really began in the year 1892, as shown in the chart, and it is something more than a coincidence that this reduction began with the year of the introduction of these pure-milk dispensatories; in addition to this good work several charitable societies, notably the New York Diet Kitchen Association and the Good Samaritan Dispensary, distributed pure milk during the hot weather to the sick infants; later on, the Children's Aid Society of Brooklyn joined in the movement.

In 1902 the department of health started in more vigorously than ever to save infant lives by carrying on a house-to-house canvass during the summer months, supplementing the employment of physicians by district nurses. In this year was inaugurated the plan of inspection of the dairy farms throughout the State and the shutting off from entrance into the city the product of farms rated below the standard set by the department. From this year on the official efforts improved upon those of each previous year.

In 1908 more stress was laid upon the educational feature of the work than hitherto. Visits were made by 80 nurses and 20 physicians to all newborn babies in certain sections of the city as soon as the births were reported.

In 1911 there were established 15 milk depots by the city authorities, the expenses of which were paid out of the city treasury, and the

New York Milk Committee raised funds sufficient to open 27 milk stations. In May, 1911, the Association of Infants' Milk Stations was organized with representatives from eight organizations maintaining 81 milk stations. The detail of the work performed by the physicians and nusrses attached to these stations is admirably stated in the special report on infant mortality and milk stations published by the New York milk committee in the summer of 1912.

During the summer just closed there were 54 milk stations in operation under the management of the health department. Quite a number were opened in January and they were added to constantly until the entire number allowed by the city fiscal authorities was reached. Up to August 1, 1912, there were 840,000 quarts of milk dispensed; 189,000 instructions were given individually to mothers; 89,000 visits were made to well babies and 30,000 to sick ones, making a total number of over 119,000 visits; 33,000 visits to homes were made by nurses. Compared with the work performed by the physicians, nurses, and nurses' assistants in 1911, the number of quarts of milk dispensed and the number of visits paid to mothers were doubled, the number of visits to well and sick babies was almost trebled, and for every one visit made by a nurse to the homes in 1911 there were five made in 1912.

The infant mortality for the year 1912 will probably be the lowest the city has ever experienced, judging from the reported deaths during the first eight months of the year.[1]

A high birth rate is accompanied as a rule by a high infant death rate. In certain sections of the city where an extremely high birth rate, varying from 45 to 55 per 1,000, existed during the years 1907, 1908, and 1909 the infant death rate fluctuated between 130, 140, 156, and 166 per 1,000 births, figures that are much above the rate for the city.

On the other hand, a low birth rate does not always presage a low infant death rate. In two sections of the city inhabited by negroes the crude birth rates were 24 and 26 per 1,000, while the infant death rates were 319 and 297 per 1,000, almost three times that of the city at large. In two sections inhabited by native whites in good financial circumstances the infant mortality was one-half and the birth rate one-quarter of that of the city as a whole.

The densely populated sections of the city are marked by a high infant death rate. Eight square blocks that harbored from 2,500 to 5,000 people within the four streets bounding each of them showed death rates among infants as follows: 130, 140, 156, 165, 166, 203, 299, and 318 per 1,000 births. Density of population did not bear a direct ratio to the diarrheal death rate among infants. Some of the most congested blocks, although showing a high rate from this cause compared with the city as a whole, still were considerably below that

of less densely crowded areas, tending to prove that racial influences modify the results of overcrowding. In three sections of this city wherein the most congested population in the entire world exists the diarrheal death rate among infants during three years was 21, 29, and 40, against 48, 72, and 92 in sections much less crowded with human beings. The effect of overcrowding upon the infant death rate from respiratory diseases, such as acute bronchitis and pneumonia, is most marked. All the areas studied gave a tremendously high rate from these causes, some areas showing a mortality double and others treble that of the city.

Viewed from the point of influence of race and nationality, the negro districts showed the highest infant mortality from all causes, from diarrhea, pneumonia, and congenital weaknesses and defects; the Italian and the Russian Polish sections were next in order of mortality from all causes, the rate from acute respiratory diseases in both districts being exceedingly high, the rate from diarrheal diseases being higher in the Russian Polish district than in the Italian. The mortality among infants of the native whites was far below that of the city, varying between 75 and 80 from all causes per 1,000 births; that from diarrheal diseases was nil in one section and in another one-fourth of the average for the city; the mortality from acute respiratory diseases was very low, and on the other hand that from congenital debility higher than most of the foreign-inhabited sections.

The difficulties that beset the health officials of the city of New York in their efforts to improve sanitary and health surroundings of the foreign-born inhabitants are many and extreme. Speaking a language other than English, superstitious, in complete ignorance of all sanitary laws, prejudiced against public officials, but fortified by the knowledge that he is in a free country and every other man's equal, the foreigner from the southern and western parts of Europe resents the intrusion into his home of the well-meaning public official. It is only within the past few years that headway has been made against the antagonistic attitude of the individual and his family who stand most in need of "knowing themselves." The entering wedge that is now forcing the foreigner described above to open his door, to welcome the health department physician or nurse, has been the education acquired by the children of the family who have attended the public schools, and once the example of good done for neighbors has been set to the benighted foreigner, then does he gladly enter into the spirit of the call and seek to do the right thing by his child and himself. There is no large city on the face of the globe that shelters such a composite of nationalities as found in New York. Russians, Poles, Bohemians, Hungarians, Austrians, Roumanians, Greeks, Syrians, Germans, French, Norwegians, Swedes, Danes, Chinese, etc., all are distributed throughout the city, often

segregating themselves in the poorer quarters of the city and maintaining a great many of their customs, racial peculiarities, and superstitions, which often are at variance with health laws as laid down by the sanitary officials.

The potential factors in the causation of infant mortality may be said to depend upon the prenatal mental, moral, and physical standard of the parent, and the post-natal environment of the infant. Who, within the sound of my voice, will gainsay the havoc wrought by the marriage of the unfit? There is no doubt that the syphilitic and gonorrheal father transmits his accursed affliction to his helpmate and their offspring, with consequent misery and death. (In passing it is instructive to note that the one cause which shows an increase in mortality among infants is syphilis.) The tuberculous parent, the idiotic or mentally incompetent parent, the alcoholic parent, the criminal parent; each and every one adds his quota toward increased morbidity and mortality.

Given an infant born of such parentage, it requires no algebraic formula to work out the expectancy of its life.

Under the head of "after natal environment of the infant," may be grouped a multiplicity of influences tending toward the elimination of the infant from earthly consideration; to enumerate, ignorance of mother, the hereditary stigmata, insufficient and inefficient maternal milk supply, extremes of temperature, sickness of mother, poverty, density of population, neglect by reason of mother's employment, etc.

The outlook for a betterment of the conditions confronting us and in the results hitherto attained is not without its rays of hope; the sky is clearing and the sun is struggling to more fully disperse its beams. The registration of venereal disease has been commenced in some of the cities, and the example set will soon be followed by other municipalities; the acquisition of information by immense numbers of the people as to the infectivity of tuberculosis and its transmissive hereditary tendency will undoubtedly serve to prevent marriage with the infected or disposed; the agitation for the application of such eugenic principles at present practicable, marks out a new field for social and economical endeavor; the diffusion of information to the expectant mother by physicians and nurses, such as was brought into play at the homes and the milk stations in New York in 1911 and continued during this year will reap undoubtedly beneficial results.

After the birth of the infant the crux of the campaign in the reduction of mortality consists in the enlightenment of the mother as to her duty in the preservation of the life of her child. The visits of the mothers to the milk stations, the advice given there by the physicians and nurses, the visits to the homes, the following up of all babies and mothers registered, the "getting in touch" with the mother, the doing away with her ignorance, superstition, and inertia; all these

can be accomplished by the expenditure of time, money, and patience, but the outlay is naught compared with the saving of life and the alleviation of misery, God knows only too prevalent in our large cities. The tendency of the age is toward the care of the individual, and whether we call it paternalism, socialism, progressiveism, matters little if the results are conducive to the moral and physical welfare of the community.

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[1] The figures for 1912 are as follows: 103 deaths per 1,000 births.

DISCUSSION.

Mr. Evans McCarthy (New York), said that it is significant that New Zealand has the lowest infant mortality in the world and that the Government of New Zealand has for some years been paying a birth benefit of $20 to the mother, enabling her to give both herself and her babe better care. The influence of the Government insurance scheme of Great Britain on the infant mortality of that country will be watched with interest. This provides a birth benefit of some $15 to each mother in employment.

THURSDAY MORNING, SEPTEMBER 26, 1912.

DIVORCE STATISTICS.

Rev. Samuel W. Dike, LL.D., secretary National League for the Protection of the Family, Auburndale, Mass.

This paper will take up the subject only from the point of view of the student of social conditions, who shows the need as he sees it and then calls on the statistician for his aid. The statistician gathers for the student of social science the needed material, analyzes and classifies it in a way to bring it into the field of study, being to him what the microscopist is to the biologist.

Accordingly, I leave the strictly statistical part of our subject to Dr. Hill, whose admirable work on the statistical text and summary tables of the last report of the Government of the United States on the subject has put every student of it under the greatest obligations. While Von Oettingen of Germany and Woolsey in the United States had much earlier given a few statistics of divorce in books discussing the general subject, the first separate report on it was made in a little pamphlet by Bodio of Italy in 1882. The next year M. Bertillon of France issued a somewhat larger pamphlet. Both these were very meager, but added somewhat to the material Woolsey had given in 1869 (or in his revised edition in 1882). Then only a few of the United States gave any figures and very few European countries.

But in 1889 the Department of Labor at Washington made an elaborate report of 1,074 pages, giving an analysis of the laws of the United States on marriage and divorce, together with complete statistics of divorce for 20 years, and such statistics of marriage as were then available. An appendix to this report presented similar material for many foreign countries. In 1909 this work was brought down to date by the Census Office in two volumes, the essential material of the report of 1889 being incorporated in it, making it really a report for 40 years. Its fine arrangement, complete analysis, and full index make this last report, including as it does all accessible material from some 20 countries, some coming from Algeria, Australia, and New Zealand, and from Japan and Formosa, so far as it goes, an admirable presentation of the subject. The collections annually of statistics by different States and countries has increased somewhat in the last 20 years. Perhaps it may be safely said that on no other social topic, save perhaps the enumeration of population and a few of its incidents are, the chief external facts now better known than on the subjects of mar-

riage and divorce. The problem now before us is so to extend the investigation as to include other data, as well as to secure the regular continuation of the work that has already been done.

The first thing needed in this direction is the collection of the data already accessible by all States and countries either annually or in short periods of years, instead of 20-year periods as now done in the United States as a whole, and their publication by at least one central agency aside from that made by the several Governments, as is now the case.

The second thing to be desired is that those States in this country and such foreign countries as do not now collect their statistics annually should make provision for annual collection. Statutory provisions for this work in the United States should be made along the line recommended by the commissions on uniform legislation. At present less than one-fourth of our States collect annually their own statistics. A few European countries, notably Russia and Greece, should begin regular collection and publication.

Thirdly. Certain data now obtainable from the official collections of a few countries only should be accessible in all if possible. These are such as the facts relating to the religious affiliations of the divorced, their occupation, ages, the length of married life before divorce, the length of the period intervening between separation and actual divorce, the number of cases in which a reconciliation was effected, and the relation of intemperance to divorce. On all these points we now have some statistics. But they should be gathered from as many sections of the country as possible for study and comparison.

Fourthly. We now come to a most important field beyond the present range of official divorce statistics, where the facts are not within easy reach but where it is very desirable that we should know them. Here the information can not, with rare exceptions, be gathered from the legal documents and records of the cases, or from the files of the courts. For we need to know a good deal about the various causes and conditions that lie back of those disclosed in the material now accessible through official documents. We need to know a great deal of those personal and social conditions under whose influence divorce is sought. It is well known that the technical grounds on which divorces are granted are often very different from the real reasons for which they are sought. Then not only psychological conditions leading to incompatibility but physiological ones, especially those due to sex, are both frequent and powerful elements in the problem. Unwillingness to have children, or even to accept the duties of sex, are doubtless causes that operate very frequently. Especially does the influence of sexual vice on divorce need investigation. But this and some of the other factors in the problem are generally carefully concealed from the courts and of course escape

record for obvious reasons. Many of the other points do not come within the range of judicial proceedings as these are now conducted.

Then, further, the influence of property, an institution which has grown up and which exists in the closest relation with the institution of the family, on divorce needs much attention. Inadequate wages, innutritious or badly cooked food, ambition for dress and for those social pleasures which money will buy, the distractions of social life among the rich, quarrels over the distribution of property in later married life, all tell more or less on the prevalence of divorce, and should therefore be studied statistically in order that their size and influence be seen so far as possible. So, too, notice needs to be taken of the parallelism, where it may exist, of the movement of divorce to that of financial conditions, and its relation to pauperism, crime, and insanity. The number of the children of the divorced in reform schools and other similar institutions needs to be known. The money cost of divorce, both direct and indirect, ought to be ascertained. In other words, all the varied and complex causes and conditions that enter into the problem should be brought, so far as they can be, within our reach by the statistician. Of course I am aware of the great practical difficulties that beset such a task. But let us not forget that a survey of all the needs of the case from the point of view of the ideal is necessary to the wisest selection we can make from them for practicable effort.

While as many States and countries as possible should enter into this thorough study, it would be of the greatest service if only a few, or one or two at the outset, should attempt it. One State might work in one direction and another State take up some other phase of the subject until a good beginning has been made. It has seemed to me practicable for a State like Massachusetts, for example, to do something in this line like that which it did 20 years ago or so in its study of the effects of intemperance on insanity, crime, and pauperism, when it put the experts of its bureau of statistics to the study of each commitment for either of these causes and traced it back to its roots. Only, instead of searching for a single cause at a time, the investigation should try to get at everything that in any way and to any degree contributes to the result. Perhaps such a work as this could be more easily done in some European country in which the people are more accustomed to official inquiries into private affairs than they are in the United States. The valuable results of such an investigation would almost inevitably lead other Governments to undertake similar work.

May I suggest, in closing, that this congress in some way take steps toward securing some action in the directions pointed out?

We never shall attain to anything like a scientific knowledge of the divorce problem until this field has been covered far better than it is at present.

MARRIAGE STATISTICS IN THE UNITED STATES.

JOSEPH A. HILL, Ph. D., Chief Statistician for Revision and Results, Bureau of the Census, Washington, D. C.

Statistics of marriages presuppose the recording or registration of marriages as they occur. National registration of marriages, however, has never been established in the United States any more than national registration of deaths or of births. Outside of the District of Columbia and the Territories, the Federal Government has, in fact, never assumed to regulate in any way the institution of marriage. Marriage in the United States receives its civic sanction from the individual States included in our national federation and is regulated and defined by the laws of these States. Naturally, there will be more or less diversity in the laws relative to any subject as enacted by 48 distinct States; and this diversity is apparent in the legal provisions and the practice relative to the registration of marriages and the compilation of marriage statistics. In many States the only record of the marriage is that kept by local officials, usually county officers; other States require State registration, but compile or publish no data; others publish merely the total number of marriages; others publish more or less statistical data relative to marriage as well as the number of marriages.

On two occasions, under special acts of Congress, the Federal Government has undertaken a comprehensive compilation of data relative to marriages and also divorces covering a period of years. On each occasion this action was taken in response to the demands of an organized movement in the United States aiming at the reform of marriage and divorce laws, the more immediate and definite object in view being the securing of uniformity of divorce legislation in the several States, by which it was believed the prevalence of divorce might be reduced. The United States Divorce Reform League, organized in 1881, which later became The National League for the Protection of the Family, was largely instrumental in this movement.

The first act of Congress authorizing the compilation of data relative to marriage and divorce was passed in 1887. The petitions urging Congress to take this action uniformly represented "the great necessity of securing such facts and information that the complicated problems surrounding marriage and divorce might be considered with a view to securing uniformity of divorce legislation in the States and to remedying whatever evils might appear as the result of this examination."

In carrying out this act, the Government through the agency of the Department of Labor, the office to which the conduct of the investigation was assigned, undertook to secure from local records

marriage and divorce statistics for a period of 20 years, extending from 1867 to 1886, inclusive. As regards the compilation of divorce statistics, the attempt was fairly successful. The compilation covered practically the entire country for the entire period, and the data compiled, although necessarily restricted to such facts as were available from the court records, which are kept without any consideration for the needs of the statistician, contained much valuable information calculated to throw much light upon the prevalence and causes of divorce. But as regards the compilation of marriage statistics the attempt of 1887 was practically a failure, although it sought nothing more than a statement of the number of marriages performed; but even this could be obtained in only a few States. The reason for the failure lay in the fact that many States lacked compulsory requirements for the proper return and record of marriages, while some of the States which had such a requirement lost the value of it because they imposed no penalty for its nonobservance.

The second compilation of marriage and divorce data by the Federal Government was undertaken in 1907, under substantially the same initiative as the first investigation and with similar ends in view. It covered another 20-year period, beginning where the other investigation left off, and bringing the statistics up to date. The divorce data being again based on court records were naturally of a kind similar to those compiled for the earlier report, although somewhat more comprehensive and complete. As regards marriage statistics, all that was attempted was again a statement of the number celebrated. But this time the attempt was more successful. The enumeration of marriages made for the most part from local records covered practically the entire country and was believed to be fairly accurate and complete.

Probably the most that can be said in favor or in justification of the practice of occasionally and at long intervals compiling marriage and divorce statistics retrospectively is that the statistics so obtained are better than none. The defects of this procedure on the other hand are fairly obvious. As compared with current registration or annual compilation it is an expensive and wasteful procedure, yielding results that are less accurate, less reliable, and less complete, and failing altogether to secure classes of data that may be of great value for statistical purposes. In order to obtain the data for the last marriage and divorce inquiry, agents had to be sent out to all parts of the United States to examine records and files running back for 20 years in the offices of local courts and county officials. The records naturally had not been kept with any view to their utilization for this purpose. In some cases they had been lost or destroyed, either by accident or through negligence. In other cases they were inconvenient of access or were more or less obliterated and defective.

In nearly all civilized countries registration systems have been established and statistics relative to marriages and divorces are compiled annually. The occasional compilation of these statistics at long intervals is, however, not to be criticized as if it were a settled and deliberate policy in the United States. It has simply happened that in response to a demand for information, the Government on two occasions has authorized an extended and costly inquiry going back 20 years. The demand is certain to arise again, however, and will have to be met in the same cumbrous way unless the Government shall, in the meantime, authorize and institute the annual compilation of marriage and divorce statistics. Is it not entirely practicable to do that, and has not the time come when that step should be taken? We already have in successful operation in this country a system for the annual compilation of death statistics, covering not the entire country, it is true, but a large and increasing portion of it, and we have recently inaugurated a similar system for the compilation of birth statistics.

It would seem, however, as if it ought to be a much easier matter to secure complete statistics of marriages, than of births or deaths, for the simple reason that marriage, unlike either birth or death, is a premeditated and voluntary act which can not take place without the sanction and formal approval of the State. In none of the United States, with perhaps one exception, can a marriage be performed without the previous knowledge of local authorities or officials representing the State or body politic; therefore it ought to be a simple matter for State officials to obtain and preserve a record of the marriage from which the statistics can be compiled.

In practically every State the parties contemplating marriage must apply to some local official representing the authority of the State for a marriage license before the marriage can take place.[1] In the New England States the license is issued by the town clerk; in other States by some county officials, usually the county clerk, but in some States by the clerk of the district, circuit, or probate court or by the judge of the probate court. A marriage ceremony performed, or a marriage contract entered into without the authorization of a license, would not be invalid but it would be irregular and the clergyman or official performing such marriage would in most States be guilty of violating the law and subject to penalties. The penalty for performing the marriage ceremony without a license is usually a fine, with the alternative in some States of imprisonment. When the fine is definitely fixed by law it varies in amount from $30 in the State of Delaware to $1,000 in the State of Alabama. More often, however, the amount of the fine is discretionary within limits prescribed in the law. In such cases there is sometimes a maximum limit only, the law providing for a fine not exceeding a certain sum, as $500 in Missouri of $1,000 in Ohio; sometimes a minimum as well as a maximum

limit is prescribed, as in Colorado, where the fine is to be not less than $50 or more than $500, or in California, where the fine is from $100 to $1,000. Vermont appears to be unique in having only a minimum limit of $10.

This requirement of a marriage license, which I believe is almost universal, is obviously of enormous advantage in connection with the compilation of marriage statistics. It gives the public authorities a degree of control over the completeness of marriage returns and a check upon their accuracy, such as does not exist in connection with the compilation of either death or birth statistics. To be sure, the burial permit is somewhat analogous to the marriage license from the statistical standpoint and yet not completely so. We are born and we die without regard to whether the public authorities are informed of the event or not. But if we are to marry we must as a prerequisite take some public official into our confidence, thus giving the demographer his opportunity to obtain in regard to us such data as may be useful for his statistical purpose.

In a large majority of the States the law requires that the marriage license when issued shall be recorded. In only a few States, however, is there any penalty for failure to comply with this provision of the law; but in every State apparently except one the marriage, after it takes place, must be reported to a local official, usually the one who issued the license authorizing the marriage. In very many States this report consists in returning the original marriage license with a properly indorsed statement that the marriage has been performed. In other States the certificate of the marriage as a separate document is returned, or a duplicate of this certificate. The period within which the return must be made is quite commonly 30 days, but in some States it is 60 days, in Missouri it is 90, and in Delaware the reports are made annually in March, while two States, Georgia and Iowa, prescribe no time limits. On the other hand, in California the report must be made within 3 days, in Maine and New Hampshire within 6 days, and in Vermont and some other States within 10 days. With few exceptions the laws impose a penalty for failure to report the marriage. Here, again, the legislatures of the different States have apparently entertained widely divergent views of the gravity of the offense of failing to report marriages. In Connecticut the delinquent is subject to a fine of from $2 to $10, and in California to a fine of from $100 to $1,000, or imprisonment from three months to one year.

In every State, except South Carolina, the law provides that the marriage when returned must be recorded, i. e., made a matter of permanent record.

Almost universally the marriage return gives more or less personal data relative to the contracting parties in addition to their names. The data generally include at least age, nativity, and color or race (i. e., whether white, Negro, Indian, Chinese, or Japanese). Occupa-

tion also and previous marital condition (i. e., whether single, married, widowed, or divorced) are commonly given. The number of the marriage, i. e., whether first, second, or third is sometimes stated. In some cases the returns include the nativity, the race or color, and even the occupation of each parent, i. e., the father and mother of the bride and the father and mother of the groom. In several instances there is a question as to the degree of blood relationship if any existing between the parties to the marriage, and in one State at least the marriage certificate records the weight and the height of the bride and groom as well as their religious beliefs.

It appears, therefore, that most of the States on their own initiative have adopted a form of marriage return which gives much, if not all, of the data ordinarily included in marriage statistics, and they have done this even in cases when no attempt is made to utilize the data for statistical purposes. Under these circumstances it would seem as if it would not be a difficult matter under the initiative of the National Government to secure the general or at least the wide adoption of a standard form of marriage return presenting all the data that it is practicable and worth while to obtain as the basis for the annual compilation of marriage statistics.

The question arises, however, whether the marriage returns to the local officials are in general approximately complete even as to the number of marriages. There is perhaps no very satisfactory criterion by which the completeness of the returns may be tested. It is of course hardly likely that the number of marriages returned would be too large. Whatever error may exist would be in direction of an understatement resulting from the failure to return marriages that were actually performed. In case of gross negligence in this respect the marriage rate would indicate it by being abnormally low. But marriage rates may vary widely without exceeding the limit of reasonable probability, and a very considerable understatement of the number of marriages might occur without resulting in a marriage rate that was suspiciously low. In the New England States, where laws relative to the return of marriages are generally regarded as effectively enforced and where marriage statistics are compiled and published annually, the number of marriages per 1,000 unmarried persons over 15 years of age ranged, in the year 1900, from 23.2 in Connecticut to 29.1 in New Hampshire and Vermont. These rates may be accepted as reliable and approximately accurate. But outside New England the marriage rates, according to the compilation of marriages made by the Federal Government in 1907—which, as previously explained, was mainly based on these records or files in offices of the local courts or county officials—were in general higher and in some States much higher than in New England. In only one State (California) did the rate fall below that for Connecticut, which was the lowest rate in the New England States. There were 18

States outside New England in which the rate ranged between 25 and 30 per 1,000 marriageable persons; in 10 other States it was between 30 and 35. Higher rates prevail in 15 States, ranging from 35.8 in Kansas to 55.5 in Indian Territory. None of these rates seem abnormally low, and in general the evidence of the rates is not such as to shake one's faith in the completeness of the marriage returns. That the rates should vary widely in different parts of the United States and in different States would be expected partly because of the diversity in the economic and social conditions, but more because of the wide diversity in sex and age distribution.

Personally I am of the belief that in most States practically all the marriages performed are duly reported to the local officials, or that the exceptions at any rate are not numerous enough to vitiate marriage rates based on these local records. But this belief rests mainly upon inherent probabilities or general considerations. The return of the marriage certificate or the reporting of the marriage is an official duty regularly devolving upon the person, very commonly a priest or clergyman, performing the marriage ceremony. He renders himself liable to a fine or perhaps imprisonment if he evades or neglects this duty; and, at the same time, he has no incentive to evade or neglect it. It is of no advantage to him to keep the marriage certificate or destroy it or make any other disposition of it than the one required by law. Moreover, under ordinary circumstances it is clearly a duty which he owes to persons married to see that the marriage is duly reported for record. Even in those cases where it is desired that the marriage be kept secret, there would usually be no additional security or precaution in not returning the marriage since, in most States at least, the return is made to the local official who issued the license authorizing the marriage and therefore already has knowledge of the event. It is very probable that those marriages which involve illegality, the parties not being entitled to marry, are not returned, but these as well as common law marriages would probably not be returned or made a matter of record under any system.

I will now summarize briefly the extent to which the several States have made use of the existing marriage records for purposes of statistical compilations.

Twenty-six States,[2] including the District of Columbia, publish no marriage statistics whatever, although a few of these States have at some time in the past or occasionally published the number of marriages and some of them, though publishing no statistics have established State registration of marriages; i. e., they require that marriages be reported for record to some central State office. Nine States[3] publish merely the number of marriages with no other data. Four States[4] publish the number of marriages with a single distinction as to nativity (native and foreign simply) or as to color, but with no further detail.

Nine States[5] give details as to age in addition to nativity or color, and some of these give also data as to number of the marriages (whether first, second, or third), and perhaps some other details.

There remains one State (Alabama) not included in these classfications which, while not publishing any marriage statistics as yet has made provision for their publication hereafter.

The population in 1910 of each of the several classes of states here distinguished is given in the following tabular statement:

	Population.	
	Total.	Per cent distribution.
Continental United States	91,972,266	100.0
States publishing no marriage statistics	39,819,270	43.3
States publishing number of marriages only	22,978,522	25.0
States publishing number of marriages by color or nativity only	6,442,377	7.0
States publishing marriage statistics by color or nativity with further detail as to age, etc. [a]	22,732,097	24.7

[a] Includes Alabama.

My conclusion is that the time has come when the United States Government should make provision for the annual compilation of marriage statistics. Probably the best procedure would be essentially that followed in obtaining statistics of deaths; i. e., the marriage data compiled by the Federal Government should be secured through the cooperation of local authorities, the action of the Federal authorities, being directed toward ensuing uniformity and completeness in the marriage returns both as regards the number of marriages and as regards the details required for statistical purposes. A model law for securing the adequate and accurate local registration of marriages should be drafted and urged upon the attention of State legislatures and a standard form of marriage certificate should be devised. Then statistics should be compiled covering those States which meet the requirements and come up to the standard established by the Federal authorities, these States constituting a "registration area" for marriage statistics similar to that long since established for death statistics and that very recently established for birth statistics.

The review of existing conditions as presented in this paper seems to me to justify the expectation that this registration area would soon after its establishment embrace at least as large a percentage of the total area and population of the United States as is covered by the present death registration area.

I am sure that all American representatives in this Congress cherish the hope of some day making the vital statistics of the United States as complete and comprehensive as those of the most advanced European countries. When to registration areas for births and deaths already established we have added a registration area for

marriage statistics another important forward step will have been taken toward the realization of this ideal.

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[1] The review of the laws relative to the return and registration of marriages presented in this paper is based mainly upon the compilation of the statutory regulations governing marriage in the United States which was published in the report of the Bureau of the Census on marriage and divorce statistics. It relates to the year 1906. Of course some changes have been made in the laws since then, but the above description doubtless corresponds very closely to the present conditions.

[2] Arizona, Arkansas, Colorado, Delaware, District of Columbia, Florida, Georgia, Illinois, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Mexico, North Carolina, North Dakota, Oklahoma, South Carolina, Tennessee, Texas, Utah, Washington, Wyoming.

[3] California, Iowa, New Jersey, New York, Ohio, Oregon, South Dakota, Montana, Idaho.

[4] Kansas, Virginia, Vermont, Wisconsin.

[5] Connecticut, Indiana, Maine, Massachusetts, Michigan, New Hampshire, Pennsylvania, Rhode Island, West Virginia.

EUGENICS AND DEMOGRAPHY.

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The subject of eugenics is not altogether a newcomer in the presence of this congress. More than 20 years ago, at the London meeting of 1891, Francis Galton pointed out, in his presidential address before the demographic section, the importance of studying the comparative increase of different classes in the population, in order to discover whether or not existing conditions of increase are favorable to the improvement of the race. In the time which elapsed between the occasion of that meeting and Galton's still recent death has occurred a phenomenal awakening of public interest in the hopeful study which he had inaugurated—"the study of influences under social control that may improve or impair the racial qualities of future generations, either physically or mentally." As one result of this quickened insight the eugenist has come to regard with new foreboding the restricted birth rate of the prospering well-to-do. Concurrently with the fresh interpretation of that phenomenon, which had long provoked curious speculation, and probably in a measure because of the spread of Galton's influence, demographers in many countries have latterly accumulated striking evidence of the effect of social rank and economic conditions on birth rates and death rates, and thus on the changing flow of the various sources from which the population is replenished.

Yet the deeper-lying eugenic problem is hardly touched by such investigators as these. Differential increase of the several social classes the statisticians have indeed substantially demonstrated. But they have failed sufficiently to question the implications of their

result. They have viewed it with a vague apprehension because of an impression that some human stocks are better worth perpetuating than others. Meanwhile the foundations of this impression have been all too little scrutinized and will so remain until we have clearer evidence that individuals are differently gifted with innate aptitudes, and that endowments of this sort, whether favorable or unfavorable, are definitely and specifically inherited.

As a matter of fact, demographers have been slow to turn from an engrossing regard for mere numbers of persons and to appreciate the importance of distinguishing human qualities. In this respect demographic studies have followed, though somewhat laggingly, the course of development over which abstract theories of population have passed. Very much as the Malthusians tried to explain misery by a counting of mouths, and failed to see that the individual's quota of the means of subsistence varies as much with the economic efficiency of the human unit as with the number of such units to be fed, so census figures and vital statistics were and often still are complacently cited as if a million of living men and women, or a birth rate fallen to 15 per thousand of population, or an infant mortality of one in four, had always the same significance, regardless of race and of everything else which destines one man to preeminent greatness and dooms another to become a public charge.

Now at last the older superficial ideas of overpopulation and depopulation are giving way to a more thoughtful analysis which holds the quantity of the populace subordinate to the quality of life, and is more careful to attribute importance to the numerical expansion or wane of peoples only where some reaction upon the quality of life is the manifest result. We may well inquire whether or not the statisticians have kept pace in this change of viewpoint.

In so far as human qualities are immediately traceable to the influence of the environment, demography has often been ready to seek out their explanation. Especially have statistics served to throw light on the external conditions of disease. Thus, to take familiar examples, the classification of deaths by causes, and the less developed study of those indispositions which are not the immediate causes of death, have revealed the comparative seriousness of the different sources of disability and suffering, and have thus directed attempts at amelioration. Infant mortality, with its implication of yet more widely prevalent illness, has ceased to be the scourge it was before vital statistics laid bare the relation between the infant death rate and the hot-weather milk supply. Seasonal and local peculiarities in the occurrence of infectious diseases, generalized and made familiar by statistics, have suggested possibilities of preventive medicine and public hygiene. Such achievements are splendid commonplaces in the record of demographic progress.

Heredity, on the other hand, has been slighted in these investigations. The demographer has shown himself preponderantly a student of circumstances—of concomitant facts. His practice has been to infer relations of cause and effect from observing not so much the slow sequence of events as the association of phenomena roughly contemporaneous. So he has plotted his figures of infant deaths, day by day, beside the readings of the thermometer. He has compared current data of tuberculosis and of housing or occupation. Perhaps, in distributing his cases of insanity, he has taken cognizance of race. Doubtless he would not deny that the incidence of disease is only in part a matter of pathogenic organisms or other exciting conditions outside of the body, and that constitutional susceptibility or resistance must likewise be reckoned a factor. Yet he seems content to leave this latter factor unexplained. Precisely at this point the study of heredity offers him results of luminous importance. But the rigidity of his statistical tradition narrows his outlook, and the correlation of traits in progeny and ancestry—the search into past generations for an explanation of us who are of the present—remains to him virtually an uncultivated field.

Such aloofness on the part of the demographer can hardly be justified upon the ground that the domain of eugenics comprises little territory common with his own. Among the subjects of contemporary eugenic inquiry will be found many of the familiar rubrics of official statistics. Or again, such a statistical undertaking as the distinction of races in the United States census—a welcome and suggestive beginning, whatever the results have thus far been—may be taken as evidence that the simplest facts of population become more intelligible when population is regarded not as a detached and momentary phenomenon, but as the process of life which it really is. However, the failure of demography to make adequate advance in the direction which eugenics now strives to point out has very likely been due to uncertainty regarding method rather than to actual obliviousness of the possible results. There remains, then, the question, how the requisite knowledge of human heredity is to be sought.

Conceivably, a mere elaboration of the census and registration methods now in use might in time assemble rich eugenic material. An ideally complete and long-continued registration of births and deaths would in itself make possible the tracing out of family histories in terms of such characteristics as causes of death, multiple births, exceptional fertility, or longevity. Practically speaking, however, this source of information is of little promise. At best it would be immensely laborious to exploit. Moreover, we are only too familiar, particularly in this country, with the obstacles to any thoroughgoing record of the occurrence and the circumstances of births. Much more hopeful would be a provision for special expert reports upon exceptionally interesting cases disclosed in registration

returns or in the ordinary schedules of the enumerators. Fortunately, the usual forms of birth and death certificate, besides stating the central facts that bear upon the event recorded, provide subsidiary information which would often afford a hint of the ease or difficulty with which fuller evidence might be secured. Thus the occupation or the place of residence might indicate that the parents, or the survivors, in the given instance, were persons of approachable intelligence; and thus, too, if a birth were returned from the birthplace of the parents, or a death from the place of birth of the decedent, by fair presumption something of the past history of the family could be learned in its neighborhood. A few qualified investigators, choosing judiciously the cases to be followed up, might in this way reach results of real significance. Similarly, a small band of field workers in the train of the census enumerators could manifold the value of our present shallow statistics of the deaf or the mentally defective. Such records as are now kept by scientific hospitals for the insane or the feeble-minded prove at once how feasible is the compilation of pedigrees showing the inheritance of these disabilities, and how illuminating is the instruction to be drawn from them.

Possibly the time has come when governments should take over the task of eugenic investigation as it is now pursued in privately endowed laboratories, notably the Galton Laboratory in London and the Eugenics Record Office at Cold Spring Harbor, Long Island. But the very fact that these two conspicuous centers of eugenic research are committed to the fundamentally different methods of the biometricians and of the Mendelian school, respectively, is eloquent of the initial uncertainties still to be cleared away in the search for an approved and established routine of study, of the kind that government bureaus may be depended on to administer satisfactorily. On the other hand, so long as governments organize and maintain staffs of workers busied in many other problematical paths of inquiry, such uncertainty is no valid reason for undue reticence in pushing forward into an outlying borderland of science where, however dubious the prospect of instant success, any genuine discovery must touch directly the very foundations of human welfare.

Whether or not official demographers should at once take upon themselves the burden of this new branch of original research, it is high time that the best accredited results of the eugenic studies of others should be given place among the provisional facts of demography. They should not indeed be received unquestioningly; they require and deserve the critical appraisal which all other statistical generalizations should undergo, and which, regrettably, much of the old-fashioned stock in trade of our ordinary compiled population statistics would never survive. But some of the new eugenic evidence is so impressive that the risk of falling into error by accepting it is probably much less than the opposite danger of failing to recognize in it

facts of the most momentous and vital nature. Thus, no statistics of the mortality from consumption are now complete without mention of the figures, offered by many serious investigators, tending to show that the diathesis of tuberculosis is hereditary. Statistics of functional insanity, or epilepsy, or chronic alcoholism—and hence, in no small degree, the statistics of pauperism, public relief, and crime—can no longer overlook the heredity factor. Conclusions regarding consanguineous marriages are hardly better than superstition until they are clarified by a discussion of the inheritance of traits like deaf-mutism, or albinism, or feeble-mindedness, as latent, "recessive," defects. Other instances might be found quite within the orthodox limits of demography.

But there is no necessity of taking these limits too seriously. The sphere of greatest achievement reaches out beyond. One generation of mankind, if it chose to act resolutely and consistently upon eugenic knowledge only a little more complete than that which we already possess, could in all likelihood reduce to insignificance certain present menaces to life and welfare and so play sad havoc with some of the quaint statistical regularities which usage has accustomed us to remark upon rather than to remedy. If now demography will but push out its frontiers here and there, as every living science sometimes must do, it can gain from the younger science of eugenics much guidance and hope of future usefulness. The need is for an interchange of good offices. The eugenists contribute the results of their pioneering labors and share the promise of a new idea. In return whatever influence of recognition and support the demographers have to give should be given in hearty cooperation to further the really critical and really auspicious branches of eugenic inquiry. For apart from evidence of the nature of human qualities numerical studies of population have little meaning.

THE EUGENICS RECORD OFFICE—ITS HISTORY, PURPOSE, AND METHODS.

H. H. Laughlin, Superintendent, Eugenics Record Office, Cold Spring Harbor, Long Island, N. Y.

The modern eugenics movement is the natural outgrowth of the general revival of study in heredity following the rediscovery of the Mendelian laws in 1900. These laws provided students of biology with a working key into the manner of the inheritance of specific traits. It was therefore quite natural that biological research should direct much of its attention toward genetic studies, and equally logical that these studies be extended to the human race.

Sir Francis Galton, who coined the word "eugenics" and laid so much of the foundation for the new science, defined eugenics as "the study of the agencies under social control that may improve or

impair the social qualities of future generations either mentally or physically." It is generally conceded that primarily such agencies are hereditary traits—mental and physical, normal and pathological, superior and defective. Secondarily, they are the forces that determine which of these traits shall survive and how they shall be combined—such agencies are sex selection and differential fecundity and survival. Tertiarily, eugenics is concerned with vital statistics which science registers the eugenic status and movement of peoples. Finally, it draws upon a host of more or less closely allied sciences, such as economics, sociology, history, medicine, anthropology, ethnology, chemistry, and biometry. Unfortunately, the immediate successors in Britain of the great Galton are quite neglecting the primary agencies of race improvement, but they are developing very extensively the science of biometry. Thanks largely to the work and influence of Dr. Charles B. Davenport, eugenics in America is developing as above outlined, fundamentally a biological science, and might more specifically be defined as the application of the laws of natural inheritance to human affairs.

Eugenics is not animal breeding, yet the analogy is a close one, and it may serve to define some of the problems of the new science by making a short comparison. Every animal breeder understands thoroughly that the material he is dealing with consists of innate hereditary traits. He understands, further, that in order to produce superior and specially gifted animals, besides being a good husbandman, he must apply care and skill in securing a mating of the best with the best. Not only must the two mates be from superior strains, but they must possess the potentiality of producing the specific traits sought. It is a matter of common knowledge that a superior Percheron stallion bred to a superior Thoroughbred mare does not produce a colt especially well adapted to any present specialized use of the horse. The mating must therefore be fit. Such matings consist not only in mating good with good, but in mating specifically desired qualities. The parents must "nick" well. The animal breeder must further take care to eliminate from his breeding stock individuals with innate general or specific defects or taints that he does not desire to introduce into his strain of animals. Now for the human side. Man is a superior and complex social being, and eugenics must and does respect the highest social codes, but man is also an animal, and as such possesses in like manner with all other animals many hereditary traits. Good traits may be combined by fortunate matings, or they may be diluted or unfortunately combined, either carelessly or ignorantly, by unfit matings. Quite naturally, then, the eugenics program is directed along two principal lines of study. The first is concerned with determining the manner of the inheritance of specific traits; the second with the practical application of eugenic principles, to the end that fit matings may

take place within the more sterling classes (aristogenics), that such matings be highly fertile, and that procreation by the socially unfit classes be rendered impossible (cacogenics). As previously stated, eugenics bears a close relation to the demographic sciences, for these latter sciences concern the mass effects of the operation of eugenic agencies. They register the eugenic status of a given community or a selected class of individuals. Without demography the nation could not in the long run accurately measure its eugenic tendencies, and without eugenics demography would be equally helpless, for what would it profit a people to know its innate traits of weakness if it were unwilling or unable to devise plans for their elimination or to know its best traits without being able to conserve them?

In order to provide for the collection of first-hand facts concerning the family distribution of specific traits, to establish a clearing house for such data, to carry on studies seeking to determine the manner of the inheritance of human traits, to study the social and biological forces at work in improving or impairing the human stock, and to devise plans for conserving the sterling traits of the race through fortunate matings, and for cutting off the supply of defectives, the Eugenics Record Office was established at Cold Spring Harbor, Long Island, N. Y., in October, 1910. Here each summer, under the direction of Dr. Charles B. Davenport, the director of the Carnegie Station for Experimental Evolution, a class consisting largely of biologically and medically trained men and women is trained in the principles and practice of eugenic studies. They are trained in gathering at first hand in the territories of the families studied data adequate to such studies. They study the biological and social factors in sex selection, differential fecundity, and differential survival. They also study the manner of the inheritance of specific traits, and are trained in the rapid and careful descriptive analysis of individuals. Each year a few of these students are added to the staff of the Eugenics Record Office as field workers in eugenics. During the first year 6 workers were thus employed, and during the second year this number was increased to 12. The eugenics field worker is a new profession demanded by the fact that the pedigrees of human traits of sufficient extent and accuracy of biological detail to determine the manner of the inheritance of traits, and to determine the breeding potentialities of given individuals, can be secured only by sending trained workers into the home territories of the families studied.

Institutions, the effectiveness and efficiency of whose work is more or less dependent upon a knowledge of the innate human traits of their patients and wards, are beginning to realize this, for within the last two years some of the institutions of Massachusetts, New Hampshire, New York, New Jersey, Pennsylvania, Michigan, Minnesota, and Illinois have initiated systematic eugenics field work. The value

of such work is undisputed, and it behooves all such institutions in all of the several States to plan systematic surveys of the defective blood within their respective States, for only through such a study can intelligent plans be laid for cutting off the supply of defectives, which, under the present methods of treatment by society, seems to be increasing rather than diminishing. Thus in 1890 the inmates of the penal and eleemosynary institutions of the country numbered 369,064, in 1900 they had increased to 634,877. The insane in institutions numbered 118.2 per 100,000 in 1890, 186.2 in 1900, and 203.8 in 1910. The several States must either continue to spend an increasingly larger portion of their annual revenues in the care of defectives, or they must provide for the elimination of their bad blood. The science of eugenics has set itself to the task of pointing out how the latter end may be accomplished.

It is greatly to be desired that future meetings of the International Congress on Hygiene and Demography will provide for a section on eugenics. At this, the Fifteenth Congress, the interests of this new and rapidly growing science are divided among the sections of demography, sex hygiene, and mental hygiene. In like manner the eugenics exhibits in the exposition accompanying the congress are scattered, while their number and the scientific and popular interest taken in them certainly justify their organization into one body.

The Eugenics Record Office has conducted special extended investigations into the manner of the inheritance of eye, hair, and skin color, hair form, albinism, epilepsy, feeble-mindedness, insanity, Huntington's chorea, harelip and cleft palate, criminalistic traits, and musical talent, and has begun the collection of data on many more traits. It is planned ultimately to cover in these studies all definitely describable human traits. Bulletin No. 6 of this office, The Trait Book, by Dr. Charles B. Davenport, is the first attempt to catalogue completely all such traits. In this book Dr. Davenport assigns, in accordance with an expansible decimal system, a definite number to each trait, whether it be sterling or subnormal, mental or physical, normal or pathological. A card index for all data coming to the office is being kept up. This index is useful in supplying ready reference to data on surname, trait, and geographical location in any combination needed by the investigator. It is planned ultimately to index all of the defective, the especially peculiar, and the especially talented blood in the American population.

The office is in close affiliation with practically all of the active students of human heredity in America, and seeks to serve them in the capacity of a clearing house. It seeks also to encourage new centers of eugenic study, and it undertakes to advise concerning the eugenic fitness of proposed marriages. This latter task it undertakes only after the pedigrees of the proposed marriage mates are prepared in accordance with special instructions issued by the office.

Thus far the office has published eight bulletins and two memoirs based upon work done by investigators either on the staff of the office or closely affiliated with it.

Bulletin No. 1. Heredity of Feeblemindedness, by H. H. Goddard.

Bulletin No. 2. The Study of Human Heredity, by C. B. Davenport and H. H. Laughlin, David F. Weeks, E. R. Johnstone, and Henry H. Goddard.

Bulletin No. 3. Preliminary Report of a Study of Heredity in Insanity in the Light of the Mendelian Laws, by Gertrude L. Cannon and A. J. Rosanoff.

Bulletin No. 4. First Study of Inheritance in Epilepsy, by C. B. Davenport and David F. Weeks.

Bulletin No. 5. A Study of Heredity in Insanity in the Light of the Mendelian Theory, by A. J. Rosanoff and Florence I. Orr.

Bulletin No. 6. The Trait Book, by C. B. Davenport.

Bulletin No. 7. The Family History Book, by C. B. Davenport.

Bulletin No. 8. Some Problems in the Study of Heredity in Mental Diseases, by Henry A. Cotton.

Memoir No. 1. The Hill Folk—a report on a rural community of hereditary defectives, by Florence H. Danielson and Dr. Charles B. Davenport.

Memoir No. 2. The Nam Family, A Study in Cacogenics, by Dr. Arthur H. Estabrook and Dr. Charles B. Davenport.

INSANITY IN THE SMALLER CITIES OF MASSACHUSETTS, 1901–1910.

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It is probably safe to say that there is a focal or zonal distribution of mental disease in Massachusetts. At least there are towns and groups of towns which have sent no new patients to the State institutions over a stretch of 10 years, whereas there are other towns and groups of towns which approach the astonishing commitment rate of 2 per cent of the population over a 10-year stretch, or 1 to 500 in a single year. To be sure, there are only a few towns (12 in point of fact) that commit no patients, and very few with the towering rates just mentioned; and we may give ourselves leave to suspect that special conditions prevail at the ends of the commitment curve.

The greatest range in the production of new cases is rural, and we ought soon to investigate intensively the special conditions which affect that range in the various towns, and more particularly the reasons for a surprising difference in the 10-year rates in our two island counties, as well as the problem of the Worcester County high-rate zone.

Yet the high-rate and low-rate zone problems after all affect small blocks of the population only. The gigantic problem numerically is urban. The rural problems yield attractive vistas for the study of constructive and restrictive eugenics and suggest the operation of hereditary forces, as it were, in pure culture. Yet no constructive eugenist dreams of a zero rate for insanity; and if ever conditions were to prevail to take one of every 500 souls out of society every

year for insanity alone, we should hardly have time to solve our problem while it yet existed.

As I write the 1911 report of the Massachusetts Board of Insanity appears, showing that in the year subsequent to the 10-year period which my general statistics cover (1901–1910) "one insane person came under care for the first time from every 1,339 of the estimated population of the State." Thus the problem of new commitments is really not so bad for the State at large by some 168 per cent as it has been for a certain town which shall for the present be nameless.

But, on account of the bulk of the urban problem and the modern concentration of social-service agencies in the cities, we must confront the major aspects of the distribution problem among cities. And first we should consider the smaller cities, because their populations, histories, and environments differ markedly enough to throw further light on the zone problem. Should certain smaller cities prove foci or zones of insanity production worse than others, we would be tempted to pursue with still greater vigor the environmental factors of our problem; for in these cities we should find the greatest variation in the conditions of life, of work, of play, of the sexes, and of national standards of living, to say nothing of local ordinances, standards of law enforcement, public opinion, organization of charity and social service, religion, morals, and philosophy.

Despite the misfortunes of certain towns, after all the cities are not only absolutely but relatively worse off than the towns in their commitment rates. The cities as a whole are committing at the rate of 7.2 per 1,000 in 10 years; the towns as a whole at 5.3. Also, as the table (Table I) below will show, the nonmetropolitan cities outstrip the towns (6.4 as against 5.3). Boston, with a rate of 9.3, is itself not quite the leader of the cities, as it is equaled by Taunton (9.3) and beaten by Chelsea (9.8). Chelsea is economically in large measure a part of the metropolis, whose cities as a whole commit at the rate of 8 per 1,000 in 10 years. Chelsea thus offers a hint of the geographical variation which we shall doubtless find in Boston itself, if ever the data can be digested. However interesting the urban range, however, it does not quantitatively approach the rural range of variation. Conditions are stabler in the cities, commitment methods are more constant, transportation simpler, publicity greater, and so on. Yet behind the flatter curve of the urban rates we can still perceive, with our rural figures in mind, the effects of a variety of differentiating conditions. The threads in hand, we could possibly set in more effective motion the wheels of organized "social uplift." Table I incidentally shows the apparent advantage enjoyed by the towns of the metropolitan district which commit at the rate of 4.6 only. As these metropolitan towns are surely better off than the nonmetropolitan towns in respect to knowledge of the world and what to do in emergencies leading to commitment, we may pause to

wonder whether rus in urbe is not a good factor and whether the metropolitanizing of greater suburban areas will not prove a slight damper to commitment production.

Before tabulating the statistics for the cities separately I will throw into—

TABLE I.—*Comparative commitment rates under metropolitan, urban, suburban, and rural conditions in Massachusetts.*

	Population, 1910.	First commitments, 1901–1910.	Number per 1,000.
Commonwealth	3,366,416	22,389	6.6
Cities	2,295,889	16,700	7.2
Boston	670,585	6,278	9.3
Cities minus Boston	1,625,394	10,422	6.4
Metropolitan District	1,378,435	10,554	7.6
Cities of Metropolitan District	1,206,791	9,748	8.0
Cities of Metropolitan District minus Boston	536,206	3,470	6.4
Towns	1,070,527	5,689	5.3
Towns of Metropolitan District	171,644	806	4.6
Towns outside Metropolitan District	898,883	4,883	5.4

Without concealing that special factors (such as national differences in the habit of "putting away" relatives and temperamental or logical differences in the commitment habits of different judges) govern some of the different rates mentioned, I will nevertheless throw into—

TABLE II.—*Hypothetical commitment numbers for Massachusetts in case the Commonwealth were committing as a whole at the rate of certain units.*

[Population, 3,366,416 in 1910.]

	Number per 1,000.	Total number.
Actual number of first commitments at rate	6.6	22,389
Hypothetical numbers at—		
Lowest town rate	0	0
Highest town rate considered	16.4	55,209
Rate of towns outside Metropolitan District	5.4	18,179
Rate of towns of Metropolitan District	4.6	15,484
Rate of towns in general	5.3	17,842
Rate of all cities	7.2	24,238
Rate of lowest city found	3.5	11,782
Rate of highest city found	9.8	32,991
Boston rate	9.3	31,308
Rate of Metropolitan District	7.6	25,585
Rate of Metropolitan cities	8.0	26,931
Rate of Metropolitan District cities minus Boston	6.4	21,545

When confronting such comparisons it is worth while to bear strongly in mind what is to a certain extent misleading throughout this work.

Of course these figures are to a certain extent misleading. We must not leap to the conclusion that cities are actually producing insanity at a greater rate than the towns; the figures show only that 1.9 more commitments per thousand have become necessary in the cities than in the towns. For aught the statistician can tell from these figures alone, the towns may be producing relatively more but committing fewer cases of insanity. However, from the standpoint of the State

treasury, there can be no doubt that the rapid urbanization of Massachusetts means the expenditure of relatively, as well as absolutely, more money upon the care of the insane, even if their natural proportion of development remains the same. "In 1875," remarks Gettemy, "632,671 persons in Massachusetts, or 38.3 per cent of the total population of the State, dwelt in places of 30,000 and over. According to the census of 1910, the number of persons dwelling in places of 30,000 or over has risen to 2,074,455, or 61.6 per cent of the total."

Two factors may alleviate the burden: The riches of the Commonwealth may rise out of proportion to the population and permit the expenditure of large sums with an easier conscience; and, secondly, it is the hope of various eugenists that the segregation of the insane (like that of the feeble-minded) may lower their marriage rate and the production of children likely to become insane. Both these factors are somewhat problematic in operation.

Let us begin the investigation of the degree of validity of such contentions by examining figures for the smaller cities. The names of these cities I propose to publish in connection with their insanity rates, feeling that no social indelicacy should attach where the stigma, so much of it as still persists, is so widely distributed, and, moreover, that more statistical validity obtains for the larger figures involved than for those of the towns. The names of the "cacogenic" towns formerly studied were intentionally omitted, because local conditions in a decade might well have influenced the numbers for that decade and would unfortunately blacken a town's name on the score of but transient reasons.

For convenience of inspection I place in Table III the figures concerning first commitments of the insane in the cities alphabetically arranged:

TABLE III.

	Population, 1910.	First commitments, 1901–1910.	Rate per 1,000.
Beverly	18,650	103	5.5
Boston	670,585	6,278	9.3
Brockton	56,878	266	4.6
Cambridge	104,839	641	6.1
Chelsea	32,452	321	9.8
Chicopee	25,401	89	3.5
Everett	33,484	155	4.6
Fall River	112,295	827	7.3
Fitchburg	37,826	245	6.4
Gloucester	24,398	202	8.2
Haverhill	44,115	291	6.5
Holyoke	57,730	309	5.3
Lawrence	85,892	574	6.6
Lowell	106,294	581	5.4
Lynn	89,336	631	7.0
Malden	44,404	293	6.5
Marlboro	14,579	128	8.7
Medford	23,150	142	6.1

TABLE III—Continued.

	Population, 1910.	First commitments, 1901–1910.	Rate per 1,000.
Melrose	15,715	96	6.1
New Bedford	96,652	447	4.6
Newburyport	14,949	97	6.4
Newton	39,806	279	7.0
North Adams	22,019	173	7.8
Northampton	19,431	159	8.1
Pittsfield	32,121	115	3.5
Quincy	32,642	170	5.2
Salem	43,697	318	7.2
Somerville	77,236	443	5.7
Springfield	88,926	444	4.9
Taunton	34,259	322	9.3
Waltham	27,834	185	6.6
Woburn	15,308	114	7.4
Worcester	145,986	1,262	8.6
Total	2,288,889	16,700	7.2

Let us first arrange the cities in groups according to their percentage incidence of insanity. The Commonwealth is committing at the rate of 6.6 per 1,000 inhabitants, and we find two cities committing at the same rate:

	Population.	Number.	Number per 1,000.
Lawrence	85,892	574	6.6
Waltham	27,834	185	6.6
	113,726	759	6.6

We find, leaving out Boston, 12 cities, committing at higher rates than the Commonwealth rate:

	Population.	Number.	Number per 1,000.
Chelsea	32,452	321	9.8
Taunton	34,259	322	9.3
Marlboro	14,579	128	8.7
Worcester	145,986	1,262	8.6
Gloucester	24,398	202	8.2
Northampton	19,431	159	8.1
North Adams	22,019	173	7.8
Woburn	15,308	114	7.4
Fall River	119,295	827	7.3
Salem	43,697	318	7.2
Lynn	89,336	631	7.0
Newton	39,806	279	7.0
Total	600,566	4,736	7.8

We find 18 cities committing at lower rates:

	Population.	Number.	Number per 1,000.
Haverhill	44,115	291	6.5
Malden	44,404	293	6.5
Fitchburg	37,826	245	6.4
Newburyport	14,949	97	6.4
Cambridge	104,839	641	6.1
Medford	23,150	142	6.1
Melrose	15,715	96	6.1
Somerville	77,236	443	5.7
Beverly	18,650	103	5.5
Lowell	106,294	581	5.4
Holyoke	57,730	309	5.3
Quincy	32,642	170	5.2
Springfield	88,926	444	4.9
Brockton	56,878	266	4.6
Everett	33,484	155	4.6
New Bedford	96,652	447	4.6
Chicopee	25,401	89	3.5
Pittsfield	32,121	115	3.5
Totals	911,012	4,927	5.4

We find that Salem is committing at the rate of all the cities combined:

	Population.	Number.	Number per 1,000.
Salem	43,697	318	7.2

and that 9 cities (with Boston a tenth) are committing at higher rates than all the cities combined. The totals for these 9 are as follows: Population, 427,727; number, 3,508; number per 1,000, 8.2.

We find that Holyoke is committing at the rate of all the towns combined:

	Population.	Number.	Number per 1,000.
Holyoke	57,730	309	5.3

and that 7 cities are committing at lower rates than the general town rate:

	Population.	Number.	Number per 1,000.
Quincy	37,642	170	5.2
Springfield	88,926	444	4.9
Brockton	56,878	266	4.6
Everett	33,484	155	4.6
New Bedford	96,652	447	4.6
Chicopee	25,401	89	3.5
Pittsfield	32,121	115	3.5
Totals	366,104	1,686	4.6

Of special interest from the point of view of percentages alone are Chelsea, a metropolitan district city, with the highest percentage found, Taunton with a percentage identical with that of Boston, Chicopee and Pittsfield with the lowest percentages found, Lawrence and Waltham with rates identical with the general commonwealth rate, Salem committing at the rate of all the cities, and Holyoke committing at the rate of all the towns.

Of special interest from the point of view of geography is a contrast in seaport cities:

	Population.	Number.	Number per 1,000.
Chelsea	32,442	321	9.8
Gloucester	24,398	202	8.2
Fall River	119,295	827	7.3
Salem	43,697	318	7.2
Newburyport	14,949	97	6.4
New Bedford	96,652	447	4.6
Totals	331,533	2,212	6.6

Let us now compare the insane-commitment rates of the various cities and city groups mentioned above with the rates for the crime-pauperism complex and for physical disease, as found by the census enumerators May 1, 1905:

	Population, 1910.	Number insane.	Number per 1,000.	Social defectives.	Number per 1,000.	Physical defectives.	Number per 1,000.
Lawrence	85,892	574	6.6	525	6.1	762	8.8
Waltham	27,834	185	6.6	54	1.9	467	16.7
12 high-rate cities (totals)	600,566	4,736	7.8	2,199	3.6	7,902	13.1
18 lower-rate cities (totals)	911,012	4,927	5.4	3,458	3.7	11,130	12.2
Salem	43,697	318	7.2	286	6.5	897	20.5
Holyoke	57,730	309	5.3	358	6.2	587	10.1
7 cities below town rate (totals)	366,104	1,686	4.6	1,181	3.2	4,103	11.2
Chelsea	32,452	321	9.8	45	1.3	526	16.2
Taunton	34,259	322	9.3	891	26.0	306	8.9
Chicopee	25,401	89	3.5	43	1.6	157	6.1
Pittsfield	32,121	115	3.5	123	3.8	443	13.7
Seaport cities, as follows:							
Chelsea	32,542	321	9.8	45	1.3	526	16.2
Gloucester	24,398	202	8.2	53	2.1	438	17.9
Fall River	119,295	827	7.3	577	4.8	922	7.7
Salem	43,697	318	7.2	286	6.5	897	20.5
Newburyport	14,949	97	6.4	67	4.4	320	21.4
New Bedford	96,652	447	4.6	467	4.8	780	8.0
Total	331,533	2,212	6.6	1,495	4.5	3,883	11.7

If Lawrence is a fair sample of the Commonwealth in respect to the commitment of insanity, how does it stand with respect to the social defectives? The percentages correspond well: Commonwealth, 5.8; Lawrence, 6.1. But the Commonwealth percentage of physical defectives, 15, does not correspond with Lawrence's, viz, 8.8. Examination of the figures yields many more instances of such lack of correlation. Waltham itself, also having the Commonwealth average

rate of insane commitments, has a much lower rate of social defectives, 1.9, than Lawrence, but about twice the rate of physical defectives, 16.7 The low rate of social defectives in Waltham homes may possibly be due to the readier drainage of such cases into the local school for the feeble-minded.

The three ratios—insane, asocial, diseased—for the cities minus Boston are 6.4 : 3.8 : 12.4, and represent findings in over 1,500,000 inhabitants. It is evident that cities of the size of Lawrence (over 85,000) may vary greatly from the general city standards (6.6 : 6.1 : 8.8), and that a small city like Waltham shows variations of great magnitude (6.6 : 1.9 : 16.7).

6.4 : 3.8 : 12.4 (Commonwealth, 1,366,416).
7.8 : 3.6 : 13.1 (12 cities, 600,566).
5.4 : 3.7 : 12.2 (18 cities, 911,012).

This comparison shows the insanity rates varying with the disease rate rather than with the asocial rate.

7.2 : 6.5 : 20.5 (Salem, 43,697).
7.2 : 5.1 : 12.6 (cities, 2,295,889).

This comparison shows another extreme example of high disease rate (as in Waltham's case), but combined with high asocial rate (unlike Waltham).

5.3 : 6.2 : 10.1 (Holyoke, 57,730).
5.3 : 7.4 : 20.3 (towns, 1,070,527).

This comparison shows that the asocial and disease rates are higher in the towns than in Holyoke, a city with the town rate of insanity. This suggests at once a generalization of the problem:

7.2 : 5.1 : 12.6 (cities, 2,295,889).
5.3 : 7.4 : 20.3 (towns, 1,070,527).

This comparison seems to show that Holyoke is a fair example of that state of affairs which discovers relatively more asocials and diseased persons in the towns than in the cities, but permits relatively more insane commitments from the cities than from the towns.

5.3 : 7.4 : 20.3 (towns, 1,070,527).
4.6 : 3.2 : 11.2 (7 cities, 366,104).

Dealing with comparatively large numbers in the above table, perhaps we may trust the triple correlation between all three ratios for the towns and those of the seven favored cities.

Concerning the commitment rate of insanity in the smaller cities of Massachusetts, we may draw the following tentative conclusions:

CONCLUSIONS.

1. As from the towns, so also from the cities, is there a marked variation in the number of insane contributed to the State institutions.

2. The range of variation is far smaller for the cities (3.5 for Chicopee and Pittsfield to 9.8 from Chelsea per 1,000 inhabitants in a period of 10 years) than for the towns (0 in the case of 12 towns to 16.4 or higher in other towns).

3. The treasury of the Commonwealth would be favorably or unfavorably affected by political geography, as follows: Most favorable to the treasury would be (1) certain rural conditions where the apparent Utopia of no commitments prevails; next (2), the conditions of certain cities (e. g., Chicopee and Pittsfield) would be apparently most favorable, unless it can be demonstrated that special commitment habits there prevail, favorable to the purse directly but indirectly unfortunate for the community. (3) More likely to approach the community's ideal are the conditions of the suburbs of Boston, which seem to produce even less insane than (4) the towns in general, which are exceeded a little by (5) the nonmetropolitan towns of the State at large. (6) The cities of the metropolitan district outside Boston, all less productive of commitments than (7) the average for the Commonwealth as a whole, or (8) that for all cities, (9) the metropolitan district as a whole, (10) the metropolitan cities, including Boston, (11) Boston, (12) Chelsea, (13) certain rural conditions.

4. Accordingly, it is safe to say that "rural degeneracy" is focal but not universal in Massachusetts, and that on the whole the towns are better off than the cities as commitment producers.

5. Certain cities can be picked out as proper subjects for intensive study: (*a*) Low-rate cities (Chicopee and Pittsfield) must be compared as well as (*b*) Lawrence and Waltham, yielding the Commonwealth's average rate; (*c*) all seven cities having a rate lower than the general town rate should be studied; (*d*) Salem might be of interest as having the average rate of all cities; (*e*) Holyoke, that of all towns; (*f*) there are surprising contrasts in the output of various seaports.

6. The attempt to utilize the census enumerations of (*a*) social defectives and (*b*) physical defectives as correlative with the official commitment rates is fairly successful and yields a degree of confidence in the census enumerators (1905) which is comforting.

7. The number of physical defectives found alive May 1, 1905, used as exemplifying conditions in the decade is found to vary up and down with the insanity rate in the different groups of cities; the number of social defectives appears to remain more nearly constant.

8. Comparison of the towns with the cities seems to show that while cities are committing more insane than towns they harbor fewer social and physical defectives than the towns. This may perhaps mean that cities have more effective means than towns of

getting rid of all sorts of defectives. If this be the case, then we may permit ourselves renewed confidence in the census statistics.

9. Another suggestive correlation is that between the towns in general and the seven low-rate cities. The seven cities distinguished by low-commitment rates are also distinguished by low rates of surviving social and physical defectives, and the latter rates are lower than those of cities in general.

STATISTICS OF FAMILIES.

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In a paper before the Congress on Hygiene and Demography at Berlin in 1907 I mentioned the statistics of families the results of which had been published before that date.

Since then the results of hardly any new inquiries have been published. Aside from a very brief report upon the households enumerated in 1905 in 16 districts of Bavaria the only ones to be mentioned are the statistics prepared in France in 1906 and 1907. These are extensive enough, however, to justify a paper upon them. I will not revert to a comparison of the methods which enable us to prepare a statistics of families. The surest method and the one that gives the largest number of useful details is that of a general census of subsisting families.

I. Fertility of Marriages.

A. ALL FRENCH FAMILIES.

1. *Fertility and sterility in general.*—In France, between 1886 and 1901, the families in the entire country enumerated every five years were classified according to the number of children living at the date of the census. No information was obtained regarding the total number of children born, and, in consequence, the figures published show not the total fertility but the balance of this fertility and the mortality.

In 1906, for the first time, the French statistics of families included all children born, distinguishing those who were alive at the date of the census and those who had previously died. Furthermore, the families were classified according to the occupation and position of the head of the family.

I will summarize the most interesting results of this study, with reference both to the fertility of marriages and to the infantile mortality.

Including families of all classes (whether headed by a husband, a widower, a divorced man, or a widow), 293 children had been born

to each 100 families. Of these 219 were alive at the date of the census and 74 had died; that is, to each 1,000 births 256 had died, or a little more than one-fourth.

If the rate of child mortality had been the same as during the period 1898–1903, 1,000 children born at the same time would have lost a quarter of their number in a score of years. As the child mortality was greater formerly than now, we might apparently assume that the number of the children who had died would have been equal to the number shown by the census in case all the children born in these families had been born about the year 1887.

Among the preceding figures the only one that can be compared with those furnished by earlier censuses is the number of living children to 100 families. This was 219 in 1906, 220 in 1901 and 1896. The decrease of the birth rate explains this small difference.

The statistics inform us regarding the age of the husband at which for marriages of equal duration the number of children is greatest. If we do not take account of the duration of marriage, the classification of families according to the age of the head loses a great deal of its meaning. Among the 8,000,000 husbands who gave the necessary data, the average number of children to 100 husbands varied as follows:

Average number of children to 100 families classified by age of husband and duration of marriage: France, 1906.

Duration of marriage in years.	Age of husbands in years.									
	Less than 30.			Total.	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	80
	Less than 20	20 to 25	25 to 30							
0 to 4	51	72	113	84	102	101	93	96	95	.....
5 to 14				194	230	248	206	174	159	177
15 to 24				.....	338	336	317	256	198	186
25 and over				.....	.....	401	375	373	365	365

It appears that, for a given duration of marriage, the average number of children to a family is not always highest when the head is youngest. Perhaps it was so formerly, since it was for marriages contracted before 1880–1885. But for subsequent marriages, especially those contracted between 1890 and 1900 and which in 1906 had lasted between 5 and 15 years, the fertility is greater for men married between 25 and 45 years of age (248) than for men married between 15 and 35 years of age (230). It is interesting to place beside the preceding table that of the proportional number of sterile families. Naturally these vary inversely to the preceding.

Average number of sterile marriages in 1,000 of group specified, classified by age of husband and duration of marriage.

Duration of marriage in years.	Age of husbands in years.									
	Less than 30.			Total.	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	80
	Less than 20	20 to 25	25 to 30							
0 to 4	56	476	289	376	300	388	498	519	520	.....
5 to 14				96	195	128	201	380	433	.....
15 to 24	.....	.....	.....	.....	58	70	105	211	343	382
25 and over	.....	.....	.....	.....	.....	47	60	67	73	75

The minimum of sterility occurs in the case of marriages contracted at the earliest age and lasting for the longest time. In the case of families where the husband is between 40 and 50 years of age and has been married more than 25 years the proportion of sterile families is less than 5 per cent (47 per 1,000). In certain groups of occupations it is as low as 3 per cent. We may assume, then, that in the total population there ought not to be more than 3 to 5 per cent of families which were sterile for physical reasons (no account being taken here of stillbirths). When an excess above this minimum appears it is due to other causes, particularly to a marked postponement of marriage. There was a relatively small number of sterile marriages in which the husband was under 20 years of age, but most of the children included in these families were conceived before marriage. The relatively large number of married men under 30 years of age who are childless is connected with the marriages contracted after the period of military service and so a little before the age of 30.

2. *Fertility and sterility according to occupation and position in the occupation.*—In the statistics of 1906[1] the families are classified according to the occupation of the head. Those families in which the head is between 60 and 65 years of age give a fairly good measure of the total fertility of marriages.[2] For all families the average number of children born to 100 families is 354. For families the head of which is the husband, the average rises to 360. Here there is a chance to examine how it changes with the social class. For employers it differs but little (359). For laborers it rises to 404 and for clerks falls to 300. These values are significant. Still it may be asked whether the differences are not due to variations in the duration of marriage. Laborers in general marry earlier than salaried employees or employers.

To avoid this difficulty, consider the marriages which have lasted more than 24 years. Among these the order is the same as already given and the figures differ little. The number of children to 100 families among salaried employees is 303, among employers 360, and among laborers 409.

Before giving more details regarding these classes, let us compare these groups with others outside the occupational classification.

One of the new classes includes persons living on income and retired and unoccupied heads of families. In this class and considering only families headed by husbands, the number of children to 100 families where the husband is from 60 to 65 years of age is 292, a figure below that of employers or even that of salaried employees. In the case of persons living on income, to be sure, the average number of children to 100 families increases with age and reaches 332 when the head of the family is 70, while at ages below 70 the average does not rise above 310 in the case of salaried employees and 360 in the case of employers. The omission of young children no doubt is more common among laborers than among salaried employees and especially persons who are retired or living on income. Furthermore, the class of persons living on income includes a large number of elderly persons who once belonged either to the class of employers or to that of salaried employees and who have enjoyed a long life and had a large family. From these results it appears that at the age at which the fertility of marriages reaches its maximum it is a little less among persons living on income and unoccupied persons than it is among the total number of employers in agriculture, industry, commerce, or the liberal professions.

In a second class are included fishermen and sailors, whose fertility is notably high—486 children to 100 families for husbands 60 to 65 years of age. Of all the classes hitherto mentioned this has the highest fertility.

Finally a third class, the social value of which is less clearly defined than the preceding, includes persons in benevolent institutions, persons under detention, vagrants, those who for any reason and to a greater or less degree constitute a burden on society, although some of them in the past have done useful work. In this class we find a peculiarity already noticed among persons retired, living on income, and without occupation. The fertility does not reach its maximum at the age of 60 to 65. Among husbands of that age there were 316 children to 100 families; at the age of 65 to 70 there were 334 and at the ages over 70 there were 353.

The class of persons in benevolent institutions, like that of persons living on income includes many who during their working lifetime belonged to other classes. Probably the majority of persons living on income were previously employers, salaried employees, fishermen or soldiers, while the majority of persons in benevolent institutions were previously laborers and the like.

In either case the man who stops working at about 60 years of age has fewer children than the man who continues to work. When the latter in turn stops working at about 70 years of age, the larger number of his children swells the average.

Let us sum up these first indications by comparing the average number of children to each 100 husbands in the age class at which the number of children reaches its maximum, for those classes which have just been enumerated.

Average number of children to 100 husbands.

Fishermen and sailors (3,000 at 60 to 64 years of age)	486
Laborers (140,000 at 60 to 64 years of age)	404
Employers (360,000 at 60 to 64 years of age and 280,000 at 65 years and over)	360
Persons in benevolent institutions, prisoners, vagrants (5,000 at 70 years and over)	353
Persons living on income and without occupation (145,000 at 70 years and over)	332
Salaried employees (5,000 at 70 years and over)	310

Now consider the same groups classed, not according to the age of the head of the family but according to the duration of the marriage. In the most numerous groups and for marriages which have lasted more than 25 years, we get the average number of children as follows: Laborers, 409; employers, 360; persons living on income and without occupation, 307.

After thus taking account of the influence of age and of the duration of marriage, we are justified in declaring that among laborers the fertility of marriages is greater than among employers, and among employers who have remained in that position it is greater than it is among persons living solely on income.

But employers, like laborers and salaried employees, are classified by occupation. It is possible that the greater fertility of employers is due to the fact that the majority of them are agricultural employers.

Let us make a first classification by distinguishing between agriculture, industry (including transportation), commerce, and the liberal professions.

Number of children born to 100 employers whose marriage had lasted more than 25 years.

Occupation group.	Number of employers.	Children born to 100 families.	
		Husband of any age.	Huband 60 to 70 years of age.
Agriculture	560,000	371	370
Industry	225,000	382	385
Commerce	120,000	340	347
Liberal professions	20,000	303	305
Total	925,000	370	371

The fertility varies noticeably from one class to another and that of employers engaged in industry is greater than that of employers engaged in agriculture. That of employers engaged in commerce or the liberal professions is decidedly less. When we turn to marriages which lasted less than 25 years, the position of employers engaged in

agriculture or industry is not the same. For marriages which last less than 5 years, 5 to 14 years, or 15 to 25 years the fertility is greater in agriculture than in industry. It seems as if employers engaged in agriculture, after having acquired more rapidly than employers engaged in industry the number of children that they desired, cease earlier to add to their families.

The detailed analysis of these occupations makes it possible to distinguish groups of similar occupations. The number of children to 100 husbands rises above 390 for persons engaged in mines and quarries, milling, in the textile industries, in the building trades, and in transportation. It falls to 350 and lower in the industries connected with the food supply, the book trade, among gold and silver smiths, and employers in the jewelry business. In the large industries employers have most children and in small industries the fewest.

Among the commercial occupations the average number of children per 100 families is especially high among butchers; and lowest among bankers and heads of financial undertakings who form a transitional class between the industrial or commercial occupations and the liberal professions.

Thus among employers the fertility seems to be connected to some degree with the characteristics of the occupation, but the influences are complicated. On one side an intellectual occupation, as it may be called, results in a low fertility, since the number of children to a family is smaller in the liberal professions, in the book trades, in financial enterprises, while such occupations as that of a butcher are attended by a relatively large fertility. On the other hand, the heads of great industries seem to have a fertility greater than that of small industries or of persons engaged in commerce.

I think we may distinguish two factors acting almost independently: On one side, the intellectual character of the occupation which entails postponement of marriage and an environment unfavorable to fecundity for reasons which need not be elaborated here; on the other side, regard for the probable future of the children. In large undertakings children more easily find employment suited to their aptitudes and obtain without excessive difficulty situations like those of their parents either within or without the country. In small establishments, on the other hand, with a few exceptions, like those of butchers where the assistance of laborers who are members of the family is almost necessary to success, the head of the family can not forecast without anxiety the future of his children.

Some of these characteristics reappear among salaried employees and laborers. Among the former, butchers' employees have the highest fertility, then overseers and foremen, whose fertility seems to be like that of laborers. Fewest children are found among employees in stores, waiters at restaurants or hotels, office employees,

and employees engaged in the public service. Finally among laborers the greatest fertility (on the average more than five children born to a family that has been in existence more than 25 years) appears among miners and textile workers. Weavers, among whom are included a great number of weavers at home, have a smaller fertility than spinners (488 children born per 100 families in comparison with 540 among the spinners). In agriculture, farm servants, who generally live on the farm, have 395 children to 100 families, while farm laborers, properly so called, have 426.

But the industries in which laborers have less than four children per family are numerous. About 500 children per 100 families which have lasted more than 25 years are found among shoemakers, coopers, toy makers, saddlers, tailors, printers, workers in metal, electricians, jewelers, gold and silver smiths, laborers engaged in various branches, hackmen, porters. It seems that occupations carried on in small establishments, and especially occupations carried on in cities, have the lowest figures. Among day laborers, or persons without a trade, who work generally in cities, there are 464 children per 100 families. Among laborers engaged in industrial work for the State, trackmen, etc., the fertility is more than 390 children born to 100 families. It falls to 360 among police employees, customhouse men, etc., and to 350 for laborers and subordinate officials in the post and telegraph service. Lastly, among domestic body servants it falls below three children born per family.

To sum up, among laborers those who are in large industries where work is comparatively regular and abundant, where the business is really stable, where life is passed either in the country or in an industrial settlement containing laborers of this one class, the fertility is comparatively high. It is lower where many small artisans live and where the trades are carried on in cities, also where the occupation requires but little physical force. It is still less where persons classed as laborers resemble the class of salaried employees, and especially where the conditions of employment or lodging give a preference for households without children or with few children.

The preceding evidence indicates that while laborers in general have more children than employers there are some occupations in which they have less. In both classes large industries seem favorable to fertility and small industries unfavorable. The influence of environment naturally has a certain effect. Regions where large industries are pursued generally differ from those devoted to small industries.

We can allow for different geographical influences by considering certain departments separately. Take, for example, a department containing large establishments and intensive culture like Nord,

where the general fertility is high, and a department devoted to grazing like Calvados, which belongs to a region where births are few and where small and average sized establishments prevail. I have computed the fertility of families the heads of which are from 60 to 70 years of age and have been married more than 25 years. In both departments fishermen and sailors have the highest fertility, but in Nord they have 745 children to 100 families, and in Calvados only 559. In the former department inmates of benevolent institutions, persons who are detained, etc., have almost six children per family, and more than laborers, who likewise have almost six children. In the latter the number of families belonging to this class is too small to give a trustworthy average, but it is lower than that of the laborers. In both departments persons living on income and persons without occupation have fewer children than laborers and employers. In both, salaried employees are the least fertile.

In Calvados it is hard to make further subdivisions in view of the fact that we must allow for the influences of age and of duration of marriage. I note only some points in which general conclusions derived from all France are confirmed. In both departments overseers and foremen classed among salaried employees have a fertility midway between that of salaried employees and that of laborers. If the fertility of the families of each occupational class in Nord is taken as 100, the following figures show the corresponding fertility for Calvados (including groups with at least 100 families):

Persons living on income	52
Agricultural employers	54
Industrial employers	63
Commercial employers	54
Railway employees	90
Employees in the public service	77
Agricultural laborers and servants	63
Laborers in the building trades	69
Manual laborers	64
Laborers in the public service	59

The railway and tramway clerks and the salaried employees in the public service are those whose fertility differs least from one department to the other. On the other hand, the number of children born per family differs most among persons living on income, agriculturists, commercial laborers, manual laborers, and laborers without a special trade (the latter being comparatively few in Calvados). It is in these last classes that the families probably are found which have had the longest connection with the department. Salaried employees engaged in the public service or the railways often move from one department to another, and they have a fertility more marked than the other classes.

This illustration will reveal the special influence of the place of residence and prove that aside from this influence fertility depends upon the occupation to an even greater degree.

B. FAMILIES OF SALARIED EMPLOYEES AND OF LABORERS IN THE PUBLIC SERVICE CLASSIFIED ACCORDING TO INCOME.

The preceding inferences confirm, but not conclusively, those which have often been drawn regarding the connection between fertility and social position. As the latter depends upon income and education, the more fortunate classes and those with the higher education should have the smallest number of children. On the other hand, fertility should be greatest in the poorest surroundings and those in which the type of life is least refined.[1] Though in a general way there is truth in this observation (a comparison between the districts of large cities or between groups classified according to various tests of income shows it), still there are modifications to be considered. For example, though employers in general are better off than their salaried employees, yet they have more children. On the other hand, salaried employees, who receive in general higher pay than laborers, have fewer children. The question has been often examined but is important enough to invite a new contribution. I derive the evidence from a recent publication in France made up by the aid of family schedules filled in 1907 by a large number of salaried employees and laborers paid by the State, the department, or the commune.[2] These officials were classed according to annual income, and, considering only those whose marriage had lasted more than 15 years, the following figures resulted:

	Annual income, in dollars.[3]								
	Less than $100	$101 to $200	$201 to $300	$301 to $500	$501 to $800	$801 to $1,200	$1,201 to $2,000	More than $2,000	Total.
Duration of marriage, 15 to 25 years:									
Salaried employees	277	241	259	245	223	231	229	238	237
Laborers	329	321	293	280	254	234	.....	.....	307
Duration of marriage, 25 years and over:									
Salaried employees	330	301	305	280	264	264	261	286	285
Laborers	348	363	346	329	305	240	.....	.....	351

[1] See Stewart Johnson in Royal Stat. Soc. Jour., LXXIV, 630–640 (May, 1911); and LXXV, 539–550 (April, 1912).
[2] Conseil supérieur de Statistique, Bulletins 10 et 11.—Statistique Générale de la France.—Statistique des familles en 1906.
[3] Counting 5 francs to the dollar.

For all classes together the preceding figures agree with those shown by the census for salaried employees or for laborers and subordinate officers in the public service. On examining the number of children according to income, it appears that the number of

laborers' children regularly decreases as the income increases. With salaried employees it first diminishes to a minimum among those receiving from $500 to $2,000 a year and then rises among those whose income is above $2,000. To complete the evidence it should be noticed that salaries and wages depend largely on the region where the person lives or whether it is city or country. Changes in fertility are subject to this double influence; the amount of income is only one factor. Unfortunately, when groups are constructed for a given locality, a given social position and a given duration of marriage, the resulting figures are so small that it is hard to establish significant comparisons. Among 400 salaried employees belonging to public services located in Paris, who had been married more than 15 years, we find a slight increase in fertility as wages increase, but, as the employees with high salaries are generally older than others, this group of marriages is not very homogeneous.

Among 1,400 laborers for the city of Paris the average number of children per family varies as follows:

Number of children born to 100 families of laborers for the city of Paris.

Duration of marriage.	Annual wages, in dollars.[a]			
	$101 to $200	$201 to $300	$301 to $400	$401 to $500
15 to 25 years	240	323	295	303
More than 25 years	328	387	368	350

[a] Counting 5 francs to the dollar.

The influence of environment appears when we study for France the families of agents scattered over the entire territory but living generally in the rural districts, like track watchers and rural guards. Among these the fertility is like that of the population around them, being greater in regions where the natality is high and less where it is low.

I have undertaken a similar investigation for salaried employees of prefects and mayors (not including servants, guards, laborers, etc.). They have in general fewer children the larger the population of the city. The like is true for the general population of the cities, but, if the ratio is taken between the fertility of such officials and the general fertility, the former is less variable than the latter.

In 1901, 100 families in Paris which had subsisted for more than 15 years had 199 surviving children; in the other cities of more than 50,000 inhabitants, 228; in the smaller cities, 266. Among administrative clerks the corresponding numbers are 183, 198, and 215, which are, respectively, 92, 87, and 81 per cent of the former series. These clerks, then, have in some degree a specific fertility which depends less than that of the laborers upon their environment.

Similar results are reached when the proportionate number of sterile families is computed.

Among marriages which have lasted more than 25 years the number of sterile marriages to 1,000 varies with income as follows:

Sterile marriages among those that have lasted at least 25 years to 1,000 total marriages of that group classified according to income of head.

	Annual salaries, in dollars.[a]							
	Less than $200	$201 to $300	$301 to $500	$501 to $800	$801 to $1,200	$1,201 to $2,000	Over $2,000	Total.
Salaried employees	95	86	99	113	101	111	109	101
Laborers	70	74	91	98	100	.....	.....	78

[a] Counting 5 francs to the dollar.

Number of families in 1,000 which have had more than 7 children.

	Annual salaries, in dollars.[a]							
	Less than $200	$201 to $300	$301 to $500	$501 to $800	$801 to $1,200	$1,201 to $2,000	Over $2,000	Total.
Salaried employees	56	53	41	33	26	23	52	44
Laborers	95	86	76	55	50	.....	.....	88

[a] Counting 5 francs to the dollar.

II. Infantile Mortality.

In the whole number of French families enumerated in 1906, as said above, one-fourth of the children born had died before the census day. Classified according to the occupation of the head, the proportionate number of children who had died to each 100 born was as follows:

Persons living on income	30
Persons in benevolent institutions	33
Fishermen and sailors	26
Employers	21
Salaried employees	20
Laborers	23

These figures do not measure the infantile mortality, because children in the various classes have been exposed to risk for very different periods. Unfortunately it was not possible to enter the ages of the children on the census schedule, but the inquiry regarding the families of officials did furnish this detail. In 1907 every official who was married, widowed, or divorced gave the number of children born of his marriage by sex and for each child which had died the year of its death. From this it has been possible to determine

separately for clerks and laborers, classified by the age at marriage, the number of children of each sex born alive classified according to the sequence of birth in the family and the year of birth. We obtained likewise in each class the number of children who had died between birth and the date of the inquiry.

This inquiry included about 300,000 officials and 600,000 children. The death rates of these children classified by year of birth and sequence of birth was as follows:

Deaths between birth and the census day to each 1,000 children born in families of Government employees.

MALES.

Year of birth.	Sequence of birth.											
	1	2	3	4	5	6	7	8	9	10	11	12
FATHER A SALARIED EMPLOYEE.												
1901–1907	116	130	134	151	180	182	150	218	.....	.....	.....	.....
1891–1900	181	196	214	235	224	279	292	306	.....	.....	.....	.....
1881–1890	240	244	272	288	277	272	335	340	.....	.....	.....	.....
1871–1880	279	285	320	320	365	389	.....	.....	.....	.....	.....	.....
1861–1870	306	358	431	533	.....	.....	.....	.....	.....	.....	.....	.....
Before 1860	424	585	609	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	205	211	230	247	244	265	284	.....	.....	.....	.....	.....
FATHER A LABORER.												
1901–1907	131	140	153	161	187	187	208	191	204	251	236	294
1891–1900	174	188	200	223	230	240	246	287	250	266	327	337
1881–1890	205	220	234	258	280	291	286	304	257	284	329	.....
1871–1880	241	268	274	298	303	336	323	364	316	.....	.....	.....
1861–1870	307	320	360	384	344	419	417	.....	.....	.....	.....	.....
Before 1860	351	363	416	395	.....	.....	.....	.....	.....	.....	.....	.....
Total	204	213	222	239	248	259	259	279	267	277	303	346

FEMALES.

MOTHER A SALARIED EMPLOYEE.												
1901–1907	95	88	119	122	147	159	178	.....	.....	.....	.....	.....
1891–1900	142	165	198	200	182	198	252	.....	.....	.....	.....	.....
1881–1890	175	219	242	253	224	286	279	.....	.....	.....	.....	.....
1871–1880	214	264	287	288	313	.....	.....	.....	.....	.....	.....	.....
1861–1870	268	298	295	.....	.....	.....	.....	.....	.....	.....	.....	.....
Before 1860	253	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	158	180	205	205	202	222	248	.....	.....	.....	.....	.....
MOTHER A LABORER.												
1901–1907	102	111	132	141	171	160	170	195	178	209	259	261
1891–1900	140	157	172	183	196	219	232	247	245	273	314	270
1881–1890	172	195	216	221	246	267	285	300	306	344	331	.....
1871–1880	206	232	262	281	264	296	325	301	361	.....	.....	.....
1861–1870	269	293	311	344	348	325	.....	.....	.....	.....	.....	.....
Before 1860	281	307	313	357	.....	.....	.....	.....	.....	.....	.....	.....
Total	169	183	199	206	214	230	244	252	254	348	308	287

The numbers in the last lines of these tables have little meaning since they combine all the age classes which it was the object of the tables to separate, so I will not delay to compare them.

Comparing the other figures, the following points may be noted:

1. Among children born at about the same time those whose father is an official have lost more by death than those whose mother is an official. Allowing for the facts that the number of women included in the inquiry is only one-tenth that of the men and that the age groups, extending over 10 years, are somewhat large, it will be noticed that female officials have fewer children than male officials and lose a smaller proportion of them. If the mother has a public office the income of the family (except in the case of widows) is greater than if the household received only the husband's earnings. Perhaps then the health of the children is better guarded, especially as they are not so numerous.

2. If with either sex we compare the death rate of children born to clerks with that of children born to laborers, it appears that the death rate of the youngest children (those born between 1901 and 1907) is generally greater among laborers than among clerks. The death rate of older children, on the contrary, is greater among clerks than among laborers.

As clerks reside mainly in cities and are better situated for securing the care which their children need, it is not surprising that the death rate of their young children is below that of laborers' children of the same age. In the case of clerks the disadvantages of life in a city are diminished when they send their children to be nursed in the country. But for older children the death rate in the families of clerks is greater than in the families of laborers. We might suppose that the higher infantile death rate in the families of laborers had caused a lower death rate of the older children. Such an explanation would agree with the opinions of the commission appointed in Italy in 1911 under the chairmanship of Senator Bodio, to examine the life tables.

3. In following the sequence of the figures along the horizontal lines of the tables, we find that the death rate increases with the number of the birth in the family. This is true whatever the sex of the head of the family and whether we are considering clerks or laborers.

Furthermore, this increase in the death rate with the number of the birth appears not only among children but in adult years. Even among persons born before 1860 and more than 45 years old in 1907, the first born have always lost a smaller proportion than later born children. The results of this inquiry make it possible to prepare life tables for births of each sort.[3]

To what influence is this increase in the death rate with the number of the birth to be ascribed?

1. Shall we suppose that subsequent born children are weaker because they are born of older parents?

2. Shall we ascribe the relatively high death rate of children whose order of birth in the family is high to the fact that the heads of the

numerous families can not care for their children as well as those who have only a very small number in charge?

The increase in the death rate with the order of birth appears both among clerks and among laborers. Hence the economic or social position of the families is not the principal cause. But we may suppose that for a given economic or social class the increase in expense resulting from a numerous family prevents giving the same care to later-born children as to the first born.

3. We may suppose that first-born children are endowed with greater physical vigor.

4. Lastly we may inquire whether the physiological and psychological condition of the parents who have many children differ from those of parents with small families.

Let us examine these theories in order:

1. In order to estimate the influence of the age of the parents I have considered first-born children separately and have determined their death rate according to the age at which their father married. About 130,000 first-born children have been classified by the age at which the father married, as less than 25 years, 25 to 35 years, 35 to 50 years, and above 50 years. (For the last class we have only about 100 children.) The following table gives the proportion of children who have died for each class:

First-born children—deaths per 1,000 births between birth and 1907, classified according to the age of the father at marriage.

Year of birth.	Age of father at marriage.			
	Less than 25 years.	25 to 35 years.	35 to 50 years.	More than 50 years.
1901–1907	111	114	113	98
1891–1900	159	173	166	237
1881–1890	190	202	189	100
1871–1880	227	237	217	.....
Total	177	180	169	170

We see that the death rate of the children is not perceptibly influenced by the age of the father.

2. The table on pages 7048 and 7049 allows a separate comparison of the death rate of children according to the number of their birth in the family. But as the children of all families are commingled, we can not take accurate account of what happens to children of the same families. In fact it is not certain that the death rate of children of the same number in the family would be the same whatever the family's size. To study this side of the question, I have considered separately families with 6 and 7 children and among their children I have selected those who were born between 1886 and

1907 (the census year). In families of 6 children (clerks and laborers combined) there were 30,820 children born between 1886 and 1907, of whom 6,945, or 22.5 per thousand, died during that period.

In families of 7 children, which were less numerous than the foregoing, there were 21,610 children born during the same period, of whom 4,953, or 22.9 per thousand, had died. We see that the mortality of these two groups of children is quite similar. Still in accordance with the general law already established the infantile mortality is greater in families of 7 than in families of 6. Now class these children according to their sequence of birth and take account only of children born at the same time. The number of these children will then be decidedly diminished, but at least each new group will be almost homogeneous.

Let us take two classes by way of example, that of the children born in 1886 and that of the children born in 1888. For each we count separately, on the one hand, the number of births and, on the other hand, the number of deaths between birth and 1907 with the following results:

Clerks and laborers combined, whose children were born in 1886 and 1888 and belong to families of 6 or 7 children.

Sequence of birth.	1886						1888					
	6 children.			7 children.			6 children.			7 children.		
	Total born.	Deaths.		Total born.	Deaths.		Total born.	Deaths.		Total born.	Deaths.	
		Number.	Per 1,000.		Number.	Per 1,000.		Number.	Per 1,000.		Number.	Per 1,000.
1	266	63	23.7	205	53	25.8	317	82	25.8	188	49	26.1
2	292	79	27.1	205	52	28.7	289	76	26.3	216	56	25.1
3	309	82	26.5	200	60	30.0	278	58	20.8	201	48	23.8
4	286	74	25.9	194	44	46.8	275	68	24.7	177	50	28.2
5	227	65	28.6	159	52	38.7	239	63	26.3	183	42	22.9
6	185	32	17.3	153	43	28.1	202	51	25.2	163	47	28.8
7	.....	.....	.....	81	21	25.9	.....	.....	.....	124	41	33.0
Total.	1,565	413	26.3	1,197	325	27.2	1,600	398	24.9	1,252	333	26.5

According to the death rates shown in the last line of this table the mortality of children is a little greater in families of 7 than in families of 6 children with like duration of risk. But in this case the proportional number of deaths no longer varies with the sequence of the birth. The irregularities in the mortality according to the sequence of the birth follow no law. They are important because of the small number of cases observed. Because of the small number we might claim that on the whole, with an equal duration of risk in a given family, the later born and the first born have equal death rates.

Furthermore, in the same family the later-born children do not seem more exposed than the first born. But the children whose sequence

of birth is quite high, of course, are found only in families of many children. In such families the mortality of children is greater than it is in small families, and this is the reason why children whose sequence of birth is high die in greater proportions than their elder brothers and sisters.

3. A last step remains to be taken—that is, to learn why the death rates in large families are greater where external conditions of age, occupation, and income are equal. The reason which suggests itself is that the burden of expense on the head of a numerous family prevents him from giving to each child the care that it needs. If this is the case the fact ought to be easily proved. First-born children ought to have the same death rate whatever the size of the family, since the added expense is incurred only with the increase of children.

Let us return to the children born between 1886 and 1907, but this time including all children born within this period whatever the number of children in the family. Select from them all first-born children, numbering nearly 90,000, the latter being classed in three groups of families, the first having 1 or 2 children, the second 3 to 6 children, the third 7 children or more. Find the number in each class who died between birth and 1907. The proportionate number of deaths in each group was as follows:

Number of first-born children in families which had prior to 1907:	
1 to 2 children—	
Born 1891–1906	59,755
Died before 1907	6,348
Deaths per 1,000 births	106
3 to 6 children—	
Born 1891–1906	27,605
Died before 1907	6,110
Deaths per 1,000 births	221
7 or more children—	
Born 1891–1906	1,347
Died before 1907	357
Deaths per 1,000 births	265

Since we are here concerned only with the first born, the fact that their death rate increases with the number of children in the family does not appear to be a consequence of the expense due to the subsequent births.

Furthermore, if we prepare the same table for laborers alone, excluding clerks, the variations in the death rate do not differ.

Among first-born children in laborers' families which included in 1907:	
1 or 2 children—	
Born 1891–1906	38,628
Deaths by 1906	4,141
Deaths per 1,000 births	107

Among first-born children in laborers' families which included in 1907—Continued.

3 to 6 children—	
Born 1891–1906	20,318
Deaths by 1906	4,374
Deaths per 1,000 births	215
7 or more children—	
Born 1891–1906	4,374
Deaths by 1906	300
Deaths per 1,000 births	257

However, it might be objected that the mortality of first-born children, being calculated in accordance with the total number of deaths which occurred between birth and 1906, the number of subsequent births might exert a certain influence upon the condition of the first born at least for some years after their birth.

So it is necessary to reduce again the groups of children considered and to free their death rate from all influence that might be ascribed to the later-born children. With this in view we study for these first-born children only such deaths as occurred either in the year of birth or in the following year. The death rates to be compared are given in the following table. By way of example I have taken first-born children born between 1891 and 1895:

Death rate of first-born children in the year of birth or the following year.

Year of birth.	Families of 1 to 2 children.			Families of 3 to 6 children.			Families of 7 or more children.		
	Number of births.	Deaths in year of birth.	Deaths in year following.	Number of births.	Deaths in year of birth.	Deaths in year following.	Number of births.	Deaths in year of birth.	Deaths in year following.
1891	2,675	144	71	2,695	258	157	319	32	13
1892	2,839	178	65	2,740	328	131	275	43	14
1893	3,067	171	75	2,841	328	137	250	44	9
1894	3,184	152	86	2,793	299	128	214	26	13
1895	3,409	202	71	2,639	320	127	128	20	8
Total	15,174	847	368	13,708	1,533	680	1,186	165	57
Deaths per 1,000 births or survivors	.....	56	26	.....	112	56	.....	139	56

The death rate of first-born children in the year of birth is 56, 112, 139, according as the family contains 2 children or less, 3 to 6 children, 7 children or more. In the following year these death rates are 26, 56, and 56. So without affirming what would probably be too strong, that the expense imposed by a number of children has no influence upon infantile mortality, it seems that this mortality depends notably on circumstances physiological or physiopsychological which precede such expenses. Everything happens as if children born of parents who are likely to have many children were subject to greater risks.

The explanation might be purely physiological, nature giving a greater power of resistance to children whose parents have little reproductive capacity.

But the explanation might equally well be largely psychological. If in each social class those who limit the number of their children are the persons who reflect most and pay most attention to the consequences of their acts, in a word, the most prudent in the individualistic sense, it is possible that their children, especially in the first years of life, are better cared for than children born of parents who are less attentive and prudent. Furthermore, when the number of children is voluntarily limited, each head of a family, having determined in advance the number of children he will have, the death of the first born leads to the birth of children to take the place, and thus results in an increase of the total number of children born.

CONCLUSIONS.

This report gives only a survey of the studies which are made possible by the statistics of families prepared in France in 1906–7. We will take account also of the considerable influence of occupation upon demographic conditions, birth rate, death rate, and marriage rate. This influence is, perhaps, more important than the influence of locality. Furthermore, the two are hard to separate. In the same region and the same city distinctions of occupation which influence the size of the family are like those which are found in the whole country, but for the same occupation the conditions differ with region or locality.

However, in the demography of any country it is much more easy to make geographical classifications than occupational classifications, so that the study of these last groups is much less advanced than the study of geographical classes. This is due to the fact that the former are exactly defined by legal prescriptions or fixed numbers. It would be desirable to secure a like precision in the studies of occupations. On this point I have presented to the Fifteenth Congress on Hygiene and Demography another note.

If this precision were secured the leading States might proceed to make comparative studies which would reveal the reciprocal influence of economic factors and demographic factors in the life of modern peoples. One feature of this sort has been mentioned by many authors, the most celebrated being Malthus; but the problem to-day is more complex than those authors saw. Some disturbing questions have been raised relative to the future of the race. There is hardly any question the methodical study of which, based on detailed and precise documents, is more needed.

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[1] Statistique Générale de la France: Statistique des familles en 1906.

[2] Above 65 years of age the number of children diminishes, partly, no doubt, because very old persons have forgotten their children who died young.

[3] See author's article in Journal of Royal Statistical Society, Vol. LXXV, p. 538 (Apr., 1912).

DISCUSSION.

Dr. WALTER F. WILLCOX thanked DIRECTOR MARCH for the very valuable report he had just read, pointed out that a similar line of work had begun in Massachusetts as early as 1885, with significant results, and had been imitated in the United States censuses of 1890, 1900, and 1910 so far as to introduce the requisite inquiries on the census schedules, but in no case thus far had the Federal returns been tabulated and published. While this entailed serious and humiliating losses of public money and of statistical energy, there was perhaps an indirect and incidental advantage in not carrying out such a Federal inquiry until after the results of this masterly French investigation were before the country as a model. Now that special local inquiries, which had been exemplified to-day, were beginning, perhaps the census inquiry giving the needed background and perspective and local or special studies giving the necessary detail and the results of intensive study will cooperate toward rapid and sound progress.

THURSDAY AFTERNOON, SEPTEMBER 26, 1912.

GENERAL PROBLEMS OF CRIMINAL STATISTICS.

Prof. Georg von Mayr, Imperial Under-Secretary of State at disposition, Professor of Statistics, Finance and Economics, University of Munich.

I submit to the congress certain considerations regarding a topic with which I have been concerned while writing my Moral Statistics. In the program of the section on demography the topic is thus stated: "The present condition of criminal statistics in the United States and European countries." I have continually had to examine the development of the criminal statistics published in various civilized countries. These studies have convinced me that the concept of criminal statistics itself must be given a much broader interpretation than is customary at the present time and that we need to examine especially the methods by which such data are presented, or should be, when criminal statistics are properly developed.

So, as one of the veterans in statistics, I may be permitted to contribute a general and summary paper on this subject. To give it a brief title, I will call it "General problems of criminal statistics, especially its field and method."

Criminal statistics include all statistical mass observations of acts condemned as antisocial and threatened with punishment by the state and all forms of the state's reaction against such acts. As a generic name for such antisocial processes I will use the word "offense" (Verfehlung), which, like the earlier terms "delict" or "crime," makes no reference to legal classifications, e. g., into crimes and misdemeanors, according to the severity of the offense. In the development of criminal statistics in the several countries allowance must be made also for this classification according to severity, because it largely controls the actual condition of such statistics. This holds true of the selection of certain groups of grave offenses and of reactions of the state against them for special statistical treatment. A preliminary selection of such groups can be made, in which other external elements besides the gravity of the offense may be taken into account (e. g., the position of the administrative officer imposing the penalty). This applies to conditions at the present time in Germany, where the registration returns included under criminal statistics are limited, first to legal sentences and secondly to serious offenses against the laws of the Empire. In other countries also the diverse treatment of

groups of varying severity or of the various stages in the state's reaction against these offenses leads to a neglect of the less serious offenses and of certain stages in the process of reaction. But these very different definitions of criminal statistics as actually developed should not lead to a narrow definition of criminal statistics. It ought to include all material which can be counted and measured obtained from the intervention of the state in offenses. It begins with the first information regarding the offense received by a public office, and ends with the final act, the payment of the penalty.

This conception of criminal statistics I have defended in my Moral Statistics, particularly that part dealing with theoretical criminal statistics (Statistik und Gesellschaftslehre, vol. 3, pp. 406–503). A fully developed criminal statistics thus conceived should take account of five main groups of statistical data:

1. *Police returns.*—These include police returns obtained not merely from police courts but also from any other police agencies. They embrace the following divisions:

(*a*) Statistics of offenses reported to the police with special data regarding some of the most serious.

(*b*) Statistics of police arrests, imprisonments, transfers, nonsuits, etc.

(*c*) Statistics of punishments by the police.

(*d*) Statistics of precautions taken by the police against the criminal classes and of the organization and technique of the provisions for safeguarding the public against criminals.

2. *Judicial decisions of all kinds.*—This is subdivided as follows:

(*a*) All kinds of preliminary decisions, administrative or judicial. Of especial importance for moral statistics are preliminary decisions connected with offenses actually committed but for various reasons not followed up. These include cases where the offenders are unknown or can not be reached or have died, and cases where the evidence is insufficient to convict. Such returns should not be treated in summary fashion, but should be thoroughly analyzed as an essential part of criminal statistics.

(*b*) Statistics of final judicial decisions: Under this head all kinds of judicial decisions and similar acts like the imposition of penalties are included. Of especial importance are the judgments in courts of first instance and judgments on appeal. The statistics of final legal decisions should be thoroughly classified according to the characteristics of the deed and of the doer. In accordance with the German example, it is usual, both in administrative statistics and in scientific discussions, to give this branch the distinctive title of criminal statistics, even when, as in Germany, it excludes great masses of minor but important offenses. If this implies that the whole of

criminal statistics is included under it, the name is fundamentally wrong. The special statistics of offenders upon whom judgments of condemnation or acquittal are passed and of their offenses are far from exhausting the whole field of criminal statistics. This is indeed the best organized and best analyzed branch of the subject. Still it is only that and not the whole.

The satisfactory development of this branch depends upon its subdivision into the statistics of offenses and the statistics of offenders. The former is concerned with the morphology of offenses and measures the degree to which society is burdened. It also considers the nature of the offenses and their connection with the persons committing them, the results of the offenses, especially in injuring persons or property, and the nature of the judgments. The statistics of offenders deals with those who are acquitted or convicted, especially the latter, and classifies the offenders according to the kind of offenses committed. A thorough statistical study of offenders includes their geographical distribution and their historical occurrence, both as a group and in various classes.

Since this branch of criminal statistics includes not only offenders who are condemned but also those who go free, the group should be classified both by the nature of the decision and by the penalty. It should be classified according to whether the persons have offended before; this leads to a statistics of recidivism. It should be classified also into physical and social groups, with constant regard to combining them with the offenses. These physical and social groups result from classifications by sex, by age, by marital condition, by occupation, by religion, by education, by physical and mental characteristics, by race and nationality, and by motives for the offense or special circumstances leading to it.

3. *A return of the persons sentenced,* to be obtained from the records of sentences, makes it possible to determine the number at a given instant who have been condemned for an offense of any kind or for certain kinds of serious offenses. This branch of criminal statistics is little developed, but in future it will be of much importance. On the one hand it shows from the records of penalties the momentary condition of the class of offenders and thus reveals the degree to which the population and its classes are burdened with criminality and the frequency with which any one person has been sentenced. On the other hand, the registration of the additions to the group of persons being punished affords material for the study of recidivism. The way in which the material should be utilized depends largely upon whether the tabulation is centralized or decentralized.

4. *Punishments.*—The statistics of punishment, especially the statistics of prisoners, a subject which in all civilized countries is a recognized part of the statistics of punishment, belongs to criminal

statistics. In a communication to a congress held at Washington little need be said on this point, for at present the entire criminal statistics of the United States is little more than statistics of prisoners.[1] A complete statistics of punishment includes the following branches:

I. Postponement and final abandonment of the punishment in case of a conditional sentence.
II. Punishment by death.
III. Punishment by imprisonment.
IV. Punishment by fine.
V. Punishment by banishment or transportation.
VI. Interferences with the execution of the punishment.

The statistics of prisoners extends beyond the field of infliction of punishments, because the data include not only those who are imprisoned as a punishment but also those who are imprisoned pending trial.

5. *Statistics of pardons.*—Aside from scattered data regarding pardons of prisoners given in statistics of prisoners, only feeble beginnings of a statistics of pardons can be found. When a general statistics of pardons has been developed, the ratio of importance for criminal statistics and criminal administration, viz, the ratio between punishments decreed and punishments paid, can be ascertained.

We distinguish between a preliminary pardon and a pardon after sentence. Preliminary pardons include (1) entire remission of the punishment before it begins; (2) conditional remission of the same sort (special statistics of this kind have recently been well developed); (3) the transformation of one kind of punishment into another before its execution begins. This applies especially to the modification of a death sentence to imprisonment or of a sentence of imprisonment to a fine. Individual pardons should be distinguished from group pardons and general amnesties.

Equally complete information is not to be had regarding these various branches of criminal statistics.

In police and administrative returns the data regarding offenses which can not be brought home to any person are of great importance. In such cases personal data are lacking, but data regarding the offense are all the more important, and for the great mass of offenses they can be had and make it possible to include them in the official tabulations. Furthermore, in preparing the material for other studies in moral statistics, which perhaps might ultimately become international, it is well to give a summary classification of the various kinds of offenses.

The attempts at such a classification have further importance primarily on account of the imperfect determination of the fact they are important for the purpose of explaining the entire morphology of offenses; therefore I recommend to the congress:

That it consider a general scientific classification of offenses paying regard to the divergencies of the different national systems.

That it constitute a committee composed partly of lawyers and partly of statisticians and consult with the International Statistical Institute in order to prepare the way for a cooperation between the committee of this congress and a committee of that body aiming at the same end.

It must be a fundamental principle that all branches of criminal statistics must be subject to exact observation and the results to detailed classification and analysis.

It is wrong to deprive certain parts of these statistics of their full value by inadequate statistical classification, or by disregarding the classification according to the kinds of offenses, as happens in the administrative statistics (Geschäftsstatistik) of many countries.

This suggests that I outline briefly the nature of these administrative statistics, especially in the field of punishments. The administrative statistics of all offices concerned with criminals, like all other branches of administrative statistics, form a part not of moral statistics but of political statistics. As a result mainly of the inadequate training of the statisticians who have them in charge, all these administrative statistics find their special justification in giving a general survey of the activities of the office. But it is no duty of theirs to make a complete presentation of the whole field of administrative statistics, as explained above, superfluous. To point to the meager results of administrative criminal statistics, and in view of that to seek to be satisfied with the adequate development of a single group of data, even though they are of especial interest, is entirely wrong. This has often been done in modern times, especially in Germany, where criminal statistics have been identified with statistics of legal decisions regarding certain main groups of offenses and all other branches have been relegated to administrative statistics.

These administrative statistics constitute a branch of political statistics, and their object is to express in figures the activity of public offices. They are no substitute for the development of criminal statistics in all its branches, as I have sketched it, a development needed both for scientific and for administrative purposes.

I can not enter upon details of method, showing how the original material is to be obtained, tabulated, and published,[2] but I must point out that for the thorough development of criminal statistics in all its branches the data derived from the original records must be given independent treatment and tabulated at a central office, technically equipped for such work, and as a part of general statistics or of judicial statistics. This is a prerequisite for the satisfactory development of criminal statistics.

This independence of the material can be secured by maintaining for statistical purposes special records in the form either of continuous registers or of individual cards. The most suitable form is individual cards. Either the act or the person may be made the unit.[3] In using enumeration cards the question arises whether the record should cover all events within a given period or those at one or at several decisive moments.

The period of time is used in the case of enumeration cards registering the events up to the conclusion of the case. The moment is used when a definite process taken from the records, for example, the judgment, is made the basis. The enumeration cards used in the German imperial criminal statistics are of the latter type. The complete contents of these as printed in the annual criminal statistics of Germany may be described as follows:

The cards employed in the criminal statistics of the German Empire take as their unit the offender or person accused and include all acts involving punishment on account of any serious offense against the imperial law. White cards are used for males and blue for females. These cards are assembled by the local officer and forwarded each quarter to the imperial statistical office.

The contents of a card are as follows:

(1) Front of card. This shows the card's serial number, the name of the court, and the quarter of the year in which the decision was reached. This side is intended to give important demographic data: (1) Family and Christian name of accused; (2) date (year, month, and day) of birth; (3) exact residence at the time the act was committed; (4) (in the case of foreigners) the country of residence; (5) religion; (6) marital condition; (7) occupation in specific detail and position in the occupation. In the case of unoccupied minors, the occupation of the parents is to be given; in the case of unoccupied wives, the occupation of the husband. At the bottom is a place for remarks, with the special statement that in case of acts committed in company and where other participants of the same act have been condemned and cards filled out for them during the same calendar year the numbers of such cards should be inserted.

(2) Back of card. This gives in three sets of questions (8–10) the returns of importance for criminal statistics. Owing to the difficulty of rendering technical German legal or judicial terms at once intelligibly to an American reader and with fidelity to the original, these three sets of questions are reproduced below in their German form from the author's Statistik und Gesellschaftslehre, Volume III, pages 481 and 482.

Art der strafbaren Handlung(en) zu bezeichnen nach der Urteilsformel bezw. dem Strafbefehle, mit Hinweis auf den oder die entsprechenden Paragraphen des Strafgesetzbuchs oder anderer Reichsgesetze (bei gemeinschaftlich begangenen Handlungen auch auf die angewendeten §§ 47, 48, 49 StGB.'s) — Versuch ist als solcher zu bezeichnen. Bei Idealkonkurrenz (§ 73 StGB.'s) ist die Handlung nur gemäß dem zur Anwendung gebrachten Strafgesetze zu bezeichnen. Stehen mehrere strafbare Handlungen in Frage (§§ 74 ff. a. a. O.), so sind dieselben einzeln untereinander aufzuführen, gleichartige Handlungen jedoch nur unter einem Buchstaben mit Angabe ihrer Gesamtzahl	Der nebenbezeichneten strafbaren Handlung(en) zu (a) (b) (c) usw. je besonders.				
	Tatort, belegen in welchem		Zeit (wenn nicht genau bekannt, ungefähre Zeit)		
	Kreise oder entsprechendem Verwaltungsbezirke (Bezirksamt, Amtshauptmannschaft, Oberamt, Amtsbezirk usw.) bei gleichnamigen Stadt- und Landbezirken, ob Stadt oder Landbezirk?	Staate?	Tag	Monat	Jahr
(a)					
(b)					
(c)					
(d)					
(e)					

A. Bezüglich jeder der zu Ziffer 8 benannten strafbaren Handlungen durch „Ja" anzugeben, ob:

und zwar zu:	verurteilt?	Verfahren eingestellt?	freigesprochen?
(a)			
(b)			
(c)			
(d)			
(e)			

B. Erkannte Strafe (Gesamtstrafe — bei (a) (d) und (f) bezw. durch „Ja" zu beantworten)

	Zeitdauer der Strafe			
	Jahre*	Monate	Wochen	Tage
(a) Todesstrafe?				
(b) Freiheitsstrafe, und zwar:				
Zuchthaus				
Gefängnis				
Festung . .				
Haft				
(c) Ehrverlust				

(d) Zulässigkeit der Polizeiaufsicht? ———
(e) Geldstrafe? Wieviel Mark? ———
(f) Verweis? ———

(*) Bei lebenslänglicher Freiheitsstrafe sind statt der Zahl der Jahre die Buchstaben ll einzuschreiben.

10. Für Verurteilte: Vorgängige (*) Verurteilungen wegen Verbrechen und Vergehen (nicht Uebertretungen) gegen Reichsgesetze (nicht Landesgesetze) durch wie viele Entscheidungen? ——— In welches Jahr fällt die letzte derselben? 1—— und zwar wegen welcher Straftat (von gleichzeitig abgeurteilten nur die schwerste)? ———

Falls auf Grund einer der Entscheidungen Freiheitsstrafe verbüßt wurde (*), Dauer der letzten Strafverbüßung: ——— Beendigung derselben am ——— ten ——— 1——

(*) vor Begehung der Straftat zu Ziffer 8; bei mehreren Straftaten, vor Begehung der der Zeit nach letzten derselben.

Außerdem sind bei Rückfällen nach §§ 244, 250[5], 261, 264 des Strafgesetzbuches die Nummern der betreffenden Paragraphen hier so vielmal zu unterstreichen, als den Rückfall bedingende Bestrafungen (nach Reichsgesetzen) stattgefunden haben.

Datum ——— Name des ausfüllenden Beamten.

A form intermediate between observation during a period and observation at a moment occurs when the card of the latter type contains details regarding the earlier procedure.

The individual card system is being used increasingly in criminal statistics. I have sketched elsewhere the Italian, French, Belgian, and Swiss systems.[4] In the United States also a transition to the card system and a centralized tabulation of the cards at Washington seems desirable. It should be considered whether enumeration cards for the sentences alone should be used or whether we should introduce such cards for other processes important especially in the case of police statistics, statistics of preliminary decisions, punishments, prisoners, and pardons.

A decision on this point calls for a more general investigation into the possibility and convenience of a further development of criminal statistics.

In conclusion, I would make two suggestions to the congress.

1. The enumeration cards now used in criminal statistics, especially those used for legal decisions, should be carefully compared. This should lead to a draft of a set of enumeration cards which might be available for serviceable international use.

2. The usefulness of enumeration cards in other branches of criminal statistics should be considered. This can best be done, in my opinion, by cooperation between a committee of the Congress for Hygiene and Demography and a committee of the International Statistical Institute. I suggest therefore, in view of the connection between these two problems, that they be referred to a special committee of this congress acting in cooperation with a committee of the International Statistical Institute.

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[1] On this point see especially the writings of R. P. Falkner and L. N. Robinson.

[2] Cf. Statistik und Gesellschaftslehre, Vol. III, secs. 60, 66.

[3] I was the first to advocate the development of criminal statistics by using the card system (in my address before the International Statistical Institute at St. Petersburg).

[4] Statistik und Gesellschaftslehre, Vol. III, sec. 60.

THE CONDITION OF CRIMINAL STATISTICS IN THE UNITED STATES.

John Koren, President, American Statistical Association, Boston.

The application of statistics to conditions of crime has probably yielded less satisfactory results than their application to any other general social phenomenon. This does not imply so much neglect of the subject, although in this country we must plead to it, as its inherent difficulties. The elements of uncertainty, the frequently unknowable factors, the subtle changes in social conditions that enter into

problems of crime are so numerous as to make criminal statistics perhaps the most difficult question with which our science can grapple. Yet it is one which specifically demands statistical treatment in order that we may understand the conditions of crime, test the methods and means by which we seek to meet them, and gain knowledge of the underlying human problem.

Whatever difficulties criminal statistics present, they are by no means insuperable, although the demands of the ignorant may make them seem so. If there is aught amiss about the criminal statistics of a country it is not a sufficient excuse to point out attendant difficulties. It is therefore a fair question, How far do the criminal statistics of the various civilized countries meet reasonable requirements? Before attempting an answer let me indicate the general purposes of criminal statistics which are: (1) To furnish a measurement of the volume of crime during a given period; (2) to present the facts in regard to the different manifestations of criminality and the different classes of criminals; (3) to exhibit the judicial methods by which crime is dealt with; and (4) to serve as a basis for intensive study of specific criminal problems.

When the criminal statistics of a country fail to serve these purposes, they at least fall short of a very modest ideal. Without setting forth details or mentioning names, one may venture the general assertion that, except in two or possibly three European countries, current criminal statistics do not adequately serve the general purposes outlined; they may stand tests technically considered, but not always and are too limited in scope to have the largest usefulness. We of the United States are put to the uncomfortable confession that our country wholly lacks criminal statistics in the broad sense of the term. To be sure, enterprising minds among us believe that they have solved many of the riddles of criminality and do not even hesitate to lay bare its precise causes. But the more cautious, who at least demand a fact basis, are everywhere confronted by a dearth of exact information. Whether one turns for facts to the authorities who take cognizance of the first manifestations of crime, or to those who sit in judgment on offenders, or to those who guard that small portion of the total criminality which expiates its misdoings behind the bars, the results are invariably disappointing.

The police, who unearth criminal acts and apprehend the supposedly guilty, through their records ought everywhere to prove a primary and indispensable source of criminal statistics. In the United States one scans police reports for the greater part in a vain search for accurate and properly digested information. With amazingly few exceptions, our municipalities do not present police statistics that are worthy of the name. Generally, the tabulated information is fragmentary, often disorderly, almost invariably lacking in

analysis, and never really comparable for different municipalities because each police bureau follows its own peculiar methods and models. There are municipalities whose population soars toward the half-million mark that do not even make public reports of police work, or do it irregularly, or content themselves with a few typewritten sheets scantily adorned with useless figures.

Except in two or three States, no attempt whatever is made to collect police returns, or, more specifically, statistics of arrests, for the State as a whole. Thus it comes to pass that when we inquire about so elementary a fact in criminal statistics as the number of homicides in the United States during any year, our main reliance is not upon official documents but upon compilations from newspaper clippings which may or may not be quite wide of the mark. With great fidelity we count our cattle, horses, and swine, but are content to guess at the number of human creatures whose lives are blotted out by their fellow beings. In short, from police statistics we can learn very little about conditions of crime in the United States.

Criminal judicial statistics, that is, statistics based upon the returns of the criminal courts, this country hardly knows except by name. But before taking up the subject of the courts, let us consider the one kind of statistics of crime of which we can make boast, namely, statistics of prisoners. For the country as a whole, the decennial report of the United States Bureau of the Census on prisoners is the chief purveyor of accurate information about crime and indeed our sole dependence. No matter how thorough and comprehensive such a report is made and even if it were issued at much more frequent intervals, an enumeration of prisoners can not meet the general requirements of criminal statistics. Merely regarded as a means of measuring the volume of crime, prison statistics do not carry far, as they disclose only that portion for which a penalty is meted out. Yet thousands are annually brought before the courts on criminal charges and convicted who escape the penalty of incarceration by payment of a fine or in other ways, and consequently do not appear at all in the Federal statistics of prisoners. Again other thousands pass through the criminal courts without being convicted and yet should be reckoned with in a thorough consideration of the conditions of crime in any community. There will always be a mass of undetected criminality that one can not take account of and which constitutes a baffling element; but to deal solely with prison statistics is to commence at the end of the story and not at the beginning.

Aside from the inherent inadequacy of prison statistics as a source of knowledge about crime, there are peculiar conditions in the United States which impair the significance of these statistics to an extent not obtaining in most other countries. Each of our States has its own criminal code, and a judicial system which may be without exact

counterpart in any other State. What is a felonious offense in one State, for instance, adultery, may be merely a misdemeanor in another State and seldom punished except by fine. In some States conviction for certain misdemeanors commonly results in a prison sentence, while in other States the same offenses may rarely be punished, or only by the imposition of a money penalty. For such apparent inconsistencies, the diversity of criminal codes is to be blamed, but also the differently constituted courts exercising criminal jurisdiction. If the codes appear out of harmony in their definition of offenses and prescriptions of penalties, the idiosyncracies of the courts in dealing with offenses are quite as marked and are strongly reflected in prison statistics. The use of the fine as a penalty may serve as an illustration. In certain States, it is almost habitual with the courts to impose a fine instead of a prison sentence when the law permits it, while in other States, the fine is sparingly employed and is gradually falling into disuse. The extent to which the fine penalty is employed at once affects prison returns and may disclose numerical proportions of prisoners wholly out of keeping with actual conditions; for, self-evidently, a very liberal imposition of fines for all sorts of offenses affords an avenue of escape from imprisonment and thus tends to keep down the prison population.

The value of prison statistics so far as adult criminality is concerned is further impaired by the introduction of the modern substitutes for imprisonment known as probation, parole, and the suspended sentence. In the State of Massachusetts, for instance, there were placed upon probation during the year 1911 a total of 13,084 persons. In each of these cases, the defendant's had, of course, actually committed the offense charged, and at least a large proportion of them, under the old conditions or those still prevailing in many States, would have been added to the prison population. In the State of New York, during 1911, about 10,000 adults were placed on probation. How many persons in the same State had the impending penalty remitted through a suspension of sentence is not known. But in the city of New York alone sentences were suspended during 1911 in 13,031 cases (611 cases of felonies and 11,420 of misdemeanors), not including cases of juvenile delinquents. In other States the system of parole takes the place of probation and the suspended sentence. It may be a parole by the judiciary granted immediately upon conviction or by special parole or prison boards very soon after commitment.

Although these new substitutes for incarceration are not employed extensively in all States, they are more and more coming into vogue and necessarily tend increasingly to diminish the numbers that otherwise would have been sent to prison. This is but another way of saying that prison statistics furnish a measure of conditions of crime in

the United States that is growing less and less available. That prison returns nevertheless have a large and abiding place in criminal statistics does not need demonstration.

The situation is even more confusing in regard to juvenile criminality when the question is of gleaning reliable information from statistics of institutions in which young offenders may be confined. With the advent of the juvenile courts, and most of the States now make some provision for these tribunals, the tendency has been wholly away from the institutional treatment of the juvenile delinquent and toward the substitution of probation, parole, and the suspended sentence for the old-time penalties. Just in what measure the new ideals in methods of dealing with juvenile delinquency operate to diminish the numbers returned by institutions is a somewhat disputed question, but that they have had a marked effect in this direction seems undeniable. At all events, the significance of institutional statistics of juvenile delinquents has been rendered uncertain and can never provide the information we ought to have about them and their acts.

Although the Federal Government has been obliged to content itself with a decennial enumeration of prisoners for the whole of the United States, it might be supposed that the individual State, through a more frequent collection of prison returns and by coupling them with other available data, would afford a fair basis of fact in regard to conditions of crime so far as it can be secured from this source. Unfortunately, it must be confessed that comparatively few States as much as attempt to assemble complete returns from all their prisons. For the prisons under the direct control of the State figures are available, though usually in a crude form with little semblance of uniformity, but for the local prisons published returns may be wholly wanting, and the records so defective as to be well-nigh useless. In not a single State are all the prisons, large and small, under central control and while this condition prevails one can hardly look for adequate prison statistics. So far from being able to depend on figures already assembled by the individual State, the Federal Government at each decennial enumeration must make a complete independent census of prisoners.

Where criminal statistics have reached their highest development their chief foundations are the returns from the criminal courts, but they are linked on one side to the records of the police, and, on the other, to records of the prisons. Even when the concern is only to gauge the volume of crime, court returns should prove the main reliance. Police statistics do not afford it because they include many who are merely suspected of wrong doing, but may be innocent, and many who, for other reasons, are not held for judicial examination. Under normal conditions, however, the mass of known criminal acts come under the view of the courts. Although public sentiment may

not stringently demand a swift and sure judgment upon offenders, most persons arrested are finally entered upon the dockets of the criminal courts. Therefore they are the safest medium of information about the extent of criminality.

Court records, if properly constituted, should also be an abundant source of knowledge concerning the different manifestations of criminality as well as the different classes of criminals. Furthermore, a study of conditions of crime should not be separated from a consideration of the instrumentalities by which society seeks to protect itself against antisocial acts, first and foremost among which are the criminal courts. It is therefore within the province of criminal statistics to note the judicial processes in dealing with offenses. In other words, the significance of the criminal offenses appearing upon the court dockets can not be rightly understood unless viewed not only in the light of the penal law, but of the judicial system itself—the composition of the courts, their jurisdiction, and the standards and sentiments governing them. All these matters have a determining influence upon the amount of crime as revealed by the returns of the courts; they furnish also a clue to the effectiveness of the judicial process as well as to the administrative and legislative principles that guide it. Self-evidently, in order to gain their full significance, criminal judicial statistics must be correlated with the human elements that constitute the antisocial classes. Here again the records of the courts should furnish material which ought to be supplemented by information gleaned from police and prison records.

While there is no lack of assent to the supreme importance of basing criminal statistics primarily upon the returns of the criminal courts, we have not yet been able in the United States to carry our theory into practice. Not a single State gathers adequate criminal statistics from the records of the criminal courts, much less the Federal Government. Not above a score of the 48 States even attempt the work. A solitary State (Indiana) has a special bureau which is chiefly busy with criminal judicial statistics. In one other State (Illinois) has a bureau of criminal statistics been established but so recently that it has not yet become active. In other States that purport to collect returns from the criminal courts, the work is done in the office of the chief prosecuting officials, the attorneys general, or under the direction of the secretary of state, or by some State board to which it is only an incidental function. The results that finally emerge are ill-assorted wares, often merely crude totals. Inaccuracy, incompleteness, and lack of intelligent treatment and analysis are their chief characteristics. In a few instances they have a certain amount of value, but the uncomfortable

truth is that not a single State produces criminal judicial statistics that are entirely worthy of the name.

It may be asked at once: Why does not the Federal Government undertake to collect and present these statistics for all the States? Admittedly, it is a task demanding special training and a high degree of knowledge; and that especially newer States should not easily be able to provide the technical skill and adequate machinery may seem reasonable enough to the foreign inquirer. The answer lies in the dual form of Government under which we live.

In all matters governing the establishment and administration of the criminal courts the individual State is sovereign, and the Federal Government can neither dictate nor interfere. To be sure, under our Constitution the Congress has authority to declare certain acts to be crimes against the Nation, and for the purpose of dealing with such crimes a Federal criminal code has been enacted and jurisdiction over them vested in the Federal courts. But the offenses that strike at the Nation, such as against the revenue, postal, banking, commerce, health laws, etc., are comparatively few in number, while the great volume of crime in the United States lies wholly within the jurisdiction of the separate States. And in all things within its jurisdiction the individual State is absolutely supreme. The Federal Government may not coerce the individual State in the exercise of its lawful jurisdiction and say how its criminal courts shall deal with crime or how it shall account for their doings. So far as criminal matters are concerned, the Federal Government is limited to its stewardship over the Federal courts, and beyond this is without authority or responsibility.

Thus it comes to pass in the United States that in collecting criminal judicial statistics all the Federal Government can do is to take such data as the records of the courts in the separate States are pleased to provide, and for the completeness and correctness of which it is not responsible and can not vouch.

The condition of vital statistics in the United States furnishes an analogy. Only within the so-called registration area—that is, within States and cities having adopted a sufficient law for the registration of deaths—can the Federal Government collect accurate vital statistics (at present relating only to mortality), but even in this domain it may exercise merely the power of persuasion and can not compel returns to be made it in a stated form.

Our dual form of government is an obstacle to the collection of criminal judicial statistics which European countries do not know. With uniform courts and codes, their central governments have absolute control over the chief sources of criminal statistics. Continental United States consists of 48 sovereign States and the District of Columbia, each one in untrammeled command of the machinery it

provides for the detection and repression of crime and brooking no interference by Federal authority.

But since all courts keep records of criminal cases and there of necessity must be a degree of uniformity between them, it is quite conceivable that the Federal Government might compile facts from such records with highly significant results. The task can be done, but it is one of vast proportions, very costly, and beset by many difficulties. The mere number of criminal courts to be dealt with, if a clean sweep were to be made of the whole field, is appalling. How many such courts there are in the United States is not definitely known, but one or two examples will serve to make the situation clear. In the State of Texas, which has less than 4,000,000 inhabitants, there are about 1,000 justices of the peace, with jurisdiction in all cases of misdemeanors subject only to a fine of not more than $200; about 90 corporation (municipal) courts, with jurisdiction of all criminal cases arising under the local ordinances and concurrent jurisdiction with justices of the peace; 238 county courts, with jurisdiction of all misdemeanors, except those over which exclusive jurisdiction is given to the justices of the peace; 66 district courts and 2 criminal district courts, with exclusive jurisdiction of all cases of felony or misdemeanor. For this one State there is a total of more than 1,300 courts to be reckoned with.

In the State of Ohio, with a population of about 4,800,000, justices of the peace, of which there are more than 700, have the limited jurisdiction of certain offenses. Each of the 144 cities and villages, if they have no police courts, may have so-called mayors' courts, with jurisdiction of violation of local ordinances and of misdemeanors. There are, further, 88 probate courts, many of which have a limited criminal jurisdiction; and 106 courts of common pleas, with jurisdiction of all crimes and offenses except those of a minor order of which jurisdiction is given justices of the peace or other inferior courts.

These two States are not the only ones that fairly swarm with courts exercising some kind of criminal jurisdiction; they are typical of most others. Indeed, the mere number of courts whose records must be transcribed if the whole extent of criminality coming before them is to be learned offers an obstacle of large dimensions.

In some European countries the official criminal statistics are restricted to graver forms of crime while certain classes of minor offenses are omitted. This narrows the field of inquiry and is a feasible if not altogether commendable method where the systems of courts and the jurisdiction are the same. In the United States such a course might lead to dire confusion. It is not so far from the truth to say that in this country we have 48 different systems of criminal courts. Here and there they may exhibit a notable degree

of correspondence in outward form; but the jurisdiction exercised in criminal cases varies, and, above all, the code definitions of crimes and the penalties prescribed show variations, inconsistencies, and apparent contradictions, which render an harmonious arrangement and classification of court returns a most perplexing problem. A complete statement of the number of minor offenses adjudicated by the courts of one State might necessitate the inclusion of several well-defined classes of antisocial acts for which the counterpart would rarely appear in other States, not because they are nonextant, but because public opinion or perhaps the criminal code does not demand their punishment, or because methods of dealing with them are left to local regulation.

Our situation would not be helped out by limiting an inquiry to certain classes of courts as their jurisdiction everywhere differs, and one would run the danger of neglecting offenses in one State that might be included in another. Equally difficult would it be to restrict statistics to certain specified classes of crime. It has frequently been suggested that, to begin with, criminal judicial statistics should deal only with felonies. But the code distinction between felonies and misdemeanors is utterly unserviceable when applied to the different States. There is no clean-cut line of division. The two categories overlap, are frequently in contradiction, or may be simply meaningless.

The distinction between them is, theoretically, not in the nature of the offense, but in the degree of penalty assigned, felonies supposedly being punishable with a more severe and more degrading penalty. As a matter of fact, however, the distinction does not hold. Sometimes the maximum penalty for offenses classed as misdemeanors runs higher than the minimum assigned for a felony. In some States the term felony has been dropped. In New Jersey, for instance, all offenses, except the specially heinous crimes, are divided into misdemeanors and high misdemeanors.

An added difficulty is the imperfect condition of court records. Just what shall constitute the items of entry in a criminal case, and in what form they shall be recorded are subject within certain limits to the pleasure of the different courts. One may glean from them generally the different steps in the judicial process, but by no means invariably. The nomenclature is often so loose that special inquiry is necessary in order to determine the nature of the offense in question and other matters. Court records almost wholly ignore the human element. Notations in regard to color, age, nativity, occupation, and general social condition of the defendants one meets with as a rare exception. Not infrequently the records fail to disclose the final outcome of a criminal case—for example, when the overcommon penalty of a fine has been imposed, which means that for failure to pay the defendant is committed to prison until he liquidates his debt to

the State by payment or work, it may not appear from the court records what actually happened, whether the fine was ultimately paid or incarceration resulted.

Such are some of the deterrent conditions confronting the Federal Government when it would collect criminal judicial statistics for the whole of Continental United States. Yet experiments already made show that the work can be done. It is at bottom largely a question of willingness to expend enough money for the sake of much-needed knowledge about one of our most important social problems. Should the results be rather meager at first, or even negative in some respects, it is certain that to have the Federal Government essay the task would be the surest means of making the separate States bestir themselves and improve the sources from which the facts are to be drawn. By persistently hammering away the Bureau of the Census has brought about a noteworthy improvement in vital statistics and in the statistics of municipalities. By similar tactics it is possible to influence the State authorities who are responsible for the adequacy of the sourses of criminal statistics—the records of the courts.

Our ultimate hope lies in intelligent State action. If we are ever to have statistics of crime that are worthy of being placed beside the best of other countries, the separate States must organize for their collection. Only when this is done can the Federal Government discharge its functions with a full measure of success. In each State there should be a bureau specifically charged with the duty of compiling annual statistics of crime and endowed with sufficient authority to secure returns in such forms as it may prescribe from the police, the criminal courts, and the penal institutions. Thus far most States lack the necessary enabling legislation or have been content with rudimentary requirements which time has proven to be inadequate.

Men of other nations view the present status of our criminal statistics with amazement and read in it a spirit of indifference, which they can not understand, because it so little comports with our progress in other directions, for instance, in penology, which at least argues intelligent interest in the crime problem. Perhaps as a nation we do not sufficiently appreciate the need of systematic knowledge. We are overfond of experimental legislation, seldom seeking a fact basis in advance and more rarely stopping to test results. This is exemplified, among other things, by our penological experiments; they have been numerous and expensive, but we have hardly made a consistent effort to take stock of their results. In the realm of criminal statistics the present untoward conditions can not be excused, but they are explainable in the light of the many unusual difficulties from which other countries are exempt. Yet we are assuredly at the beginning of better things. The crime problem looms large upon the horizon of thinking men. There is a clamor on many sides for an

improvement of the instrumentalities wherewith to meet crime. National bodies like the National Conference of Charities and Correction, the American Bar Association, the American Institute of Criminal Law and Criminology, the American Prison Association, and many others are working, each within its own domain, for the betterment of the forces responsible for the detection, adjudication, and punishment of crime. And incident to their efforts is a persistent demand for statistics of crime as a basis for and stimulus to progressive work. The fruits may be slow in coming, but signs of an awakening are multiplying. The needs of different States are being studied and the requisite legislation considered. Here and there first steps to secure criminal statistics have been taken. For the moment the question is of arousing local initiative and to guide and harmonize it. In this field the American Institute of Criminal Law and Criminology is especially active. At some not too distant period one may expect that the Federal Government through its Bureau of the Census will exercise beneficent influence upon the endeavors of eventual State bureaus of statistics of crime and help unify their work. The situation is one of distinct hopefulness if as yet not one of much solid achievement.

At this moment our knowledge of criminal conditions permits us to say that two years ago (1910) there were present in our penal institutions 113,579 prisoners, equivalent to 125 such per 100,000 of the then population; that during the calendar year there were committed to prison a total of 479,763 persons, equivalent to 522 per 100,000 of the population, and that there were discharged from prisons, died in them, or were transferred to other institutions, a total of 475,720 persons. Beyond these crude totals which may also be shown for the separate States, we can not go, although they will later be supplemented by details for the same prisoners. One can not even hazard a respectable guess in regard to the number of the criminal acts that resulted in the apprehension of alleged perpetrators, and what proportion they bear to the number finally brought before the criminal courts. There may be and probably are more than a million arrests in the United States in one year. There are assumedly over half a million defendants in criminal cases that face the bar of justice each year; but by how many hundred thousand the number is exceeded, who may tell?

The mere suggestion of the extent of criminality in the United States, its cost in money and lives should make us pause and question. At some time the contemplation of these elementary things will force us to seek knowledge that may help to erect barriers to this flood of criminality, and one of the chief contributions to it will be derived from competent criminal statistics; they have long been delayed, but are surely coming.

PROGRESS TOWARD THE CONSTRUCTION OF LIFE TABLES FOR THE POPULATION OF THE UNITED STATES.

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As early as about 1760 there were population mortality tables based upon adequate and sufficient data and correctly deduced. Somewhat earlier, there had been exhibited a mortality table arranged in a proper manner but not correctly deduced because based upon deaths only. This was based upon the death returns only of the city of Breslau in Germany and was the work of the great English scientist, Edmund Halley. The famous Northampton table, also based upon returns of deaths only, was the work of Dr. Richard Price, a leading Scottish divine and philanthropist, and was produced at virtually the same time as the Swedish population tables which were based upon correct and ample data. Dr. Price would not have brought forward his Northampton table, had it been possible to command data so complete and applicable in Great Britain as were already available in Sweden.

The data required in order to produce a correct and satisfactory population mortality table may be defined under three heads:

1. An enumeration of the number living at each age.
2. Statistics deduced from registration of deaths, arranged according to age.
3. Statistics deduced from registration of births.

More than a century and a half ago Sweden provided for repeated and frequent censuses, embracing accurate enumerations of the people according to sex and age, and for the registration throughout the kingdom of births and of deaths.

Before proceeding to show how necessary are all three requisites to the ascertainment with accuracy and completeness of the mortality rates at the different ages and for the two sexes, I pause to say that Sweden has maintained all these three departments of the public service, constantly improving the methods of ascertainment, from that day to this, and to remark also that, notwithstanding the superior natural physique of the Swedes, it can scarcely be doubted that frequent and accurate comparisons of the death rates from period to period has had a great deal to do with causing such improvements in hygiene that the average length of life in Sweden is now, and for a long period has been, greater than among any other people in the world.

It needs no reflection to perceive we can not cope with evils unless we know them, and so long as men go on deluding themselves, as we of the United States have deluded ourselves, that they have an

almost ideal condition as regards longevity, they are not likely to put as much stress upon improving the conditions as they should, and as they would were they informed of the facts. The Swedes, thus fully informed, not only as to the actual conditions but also as to their cause, to which we shall refer hereinafter, have laid their plans to cope with the most evil influences and, so far as possible, to offset them, and the result, as stated, has been not only a greater average longevity than among other nations but constant improvement in this regard.

Other countries, most of them rather slowly and with many halts and even relapses, have brought themselves up to something approaching the Swedish standard, set 150 years ago, which except in the mere matter of methods of assuring greater accuracy and completeness, has not been improved upon since that time nor, indeed, been susceptible of improvement. Of the civilized nations, the United States has been and still continues to be the most laggard in these respects, though very great progress has been made within the last 15 years, and there is good ground to hope that, notwithstanding the great obstacles to be overcome, we shall make a creditable showing in another decade or so.

A rather good beginning was made at an early date in the United States in the one State of Massachusetts, where information by no means complete or accurate, but, notwithstanding, intelligently compiled, was secured more than a century ago and embodied in the Wigglesworth table. Though neither the data nor the construction can be said to have been flawless, yet both were better than we had an opportunity to command after that time until the year 1900.

In the meanwhile, notwithstanding that the United States censuses were covering more ground and were in many respects more complete and satisfactory than those of other countries—so much so that in many of these countries our long list of questions was viewed as an intolerable and inexcusable intrusion and inquisition into purely private matters—we were, as regards the data required for a mortality investigation, almost completely at sea. The census, it is obvious, is unfitted to supply such data except, at most, the enumeration of those living at a given moment of time. An attempt was made, to be sure, extending through several censuses, to supplement this with purely hearsay information, i. e., the statement of those who were still living concerning deaths in their family and among their relatives which had taken place during the preceding twelve months or some other period, giving age, sex, cause of death, etc.; but obviously such information could not be reliable and, indeed, was in the end definitely proved to have been untrustworthy. A like attempt to supply information

concerning births during previous years produced similarly unreliable results, though it was not so easy to prove this.

Actuaries regarded the data thus supplied as wholly unsuitable and in but one noteworthy case did an American actuary, skilled in the artifices by which members of that profession are able at times to infer facts from data, even though incomplete and defective, which would be quite beyond the unskilled, attempt to make any use of the population data obtained by taking censuses in the formation of a mortality table.

This one attempt was made by Prof. Levi Meech, an actuary who had been intrusted with the preparation of a mortality table, since known as the "Thirty American Offices Table," or more familiarly, "Meech's table," from the mortality experience of 30 American life insurance companies. Mr. Meech was struck by the fact that, notwithstanding the American Republic had already attained a respectable age and was nearing the century mark, no mortality table represented even crudely the general population experience, either male or female, in the United States of America. He was quite aware that the data could not possibly be used in the construction of such a mortality table by the usual methods and processes and that for its construction full information as to births and deaths obtained by registration would be required, as well as information concerning the number living at a given moment of time as obtained by taking a census.

It occurred to him, however, that a census taken in the usual manner followed by a similar census at the end of the decade would, if there had been no changes in the nation due to immigration or emigration, exhibit in the returns by the second census of those living at a given age, precisely the number who had survived 10 years from those exhibited in the previous census at an age 10 years younger; that is to say, suppose a certain number had been found in the census of 1850 to be of the age of 30 years and no additions were made to the population by immigration and there was no loss by emigration, in such case it would be obvious that the number found by the census of 1860 to be of the age of 40 years were the survivors of those who were 30 years of age 10 years earlier.

There are actuarial formulas by means of which, given the number surviving at the end of 10 years, for instance, out of a certain group of persons of given ages, the data embracing all ages, it is possible to deduce the probability of the survival not only for these periods of 10 years, which, of course, can be done directly, but also by a suitable mathematical process, to obtain the annual rate of mortality at each age; and, this having been accomplished, of course it is easy to construct a mortality table.

Mr. Meech set forth the results of such an investigation, based on the censuses from 1830 to 1860 inclusive, in two mortality tables which he designated as the American Male Mortality Table and the American Female Mortality Table. These may be consulted in his Systems and Tables of Life Insurance, 1886 edition. The choice of names, while apparently suitable, was unfortunate in that the name of "American Experience Mortality Table" had already been given to another table, since widely accepted as the standard of valuation in the computation of rates of life insurance companies. In the volume mentioned, he gave a brief but somewhat confused and unsatisfactory account of the methods by which the table had been constructed. The most useful thing in this description is the statement that the construction was by the use of what is known as "Makeham's first law," a well-recognized actuarial formula which it is not difficult to apply to the construction of a table from such data as Mr. Meech was discussing.

The table which he produced has never been accepted in any way as fairly representative of the population mortality in this country, not by any means because the mathematical methods by which it was constructed have ever been questioned, although, as stated, the same were not luminously and clearly described, but because in the reduction of the population statistics to the forms of data required in order to make this computation, he was compelled to make many assumptions as regards the proper corrections for emigration and immigration, the correctness of which it is not possible to concede in the absence of further and more accurate information.

In the census of 1850 inquiry was made as to deaths in the family during the preceding twelve months—a method followed in subsequent enumerations and supplemented in 1890 by an effort to combine registration records of deaths, where made by State or municipal authority, with the census returns. So far as a mortality table is concerned, this never resulted in anything worthy of even a bare reference but very comforting and, as it transpired, very delusive conclusions were arrived at, in consequence of this investigation, concerning the general mortality rate of the country taking its population as it stands, that is, combining persons of all ages. Mr. Walter F. Willcox exposed ruthlessly the utter groundlessness of the comforting assurance of superior longevity which these statistics had created, in an article published in the Journal of the American Statistical Association in September, 1906.

The ground upon which Mr. Willcox was able utterly to explode the fallacies of the census method which had then been employed was by showing that in districts where there had been careful registration of

deaths enforced by State or municipal authorities, the facts were widely different from the census returns of deaths and that in every case without exception the actual deaths had been much heavier than were reported in the census enumeration.

In consequence of these things many persons who had hitherto shown but little interest in the matter came to the support of those stalwart souls who had for years been laboring to secure effectual registration of deaths and also of births. The Census Department also, even though completely dissolved and reconstituted every 10 years, gave much encouragement both to the extension of the registration areas and to the perfection of registration returns, and by 1900, when the Census Bureau was made a permanent department, the census authorities were fully committed to the policy of encouraging the extension of registration throughout the country, the sending of returns directly to Washington, and the standardization of systems and methods of registration. Already by 1900, notwithstanding the great obstacles due to the maintenance of State lines and the impossibility under our constitutional limitations, whether real or merely fancied by many persons I do not venture to say, of requiring registration as a national matter, very considerable progress had been made in these regards. Several States and many cities had bureaus of vital statistics under one name or another, and somewhat more than 25 per cent of all the people of the country lived in States or in municipalities where fairly efficient registration was in force.

The Bureau of the Census, recognizing the extraordinarily good work which had been done in these regards in various States, particularly in the State of Michigan, secured Dr. Cressy L. Wilbur, of the Michigan department, and put him in charge of vital statistics in the permanent Bureau of the Census. Since that time there has been steady and unremitting encouragement both of the extension of registration areas and of the improvement and standardization of registration methods, until by the time the census of 1910 was undertaken the States and municipalities where such registration was maintained comprehended more than 50 per cent of the entire population of the United States.

Congress, with its customary disregard of the real importance of things where appropriations are involved and especially with its dread and suspicion of everything new, exhibited such impatience in 1900 both at the slowness with which the Bureau of the Census appeared to proceed and particularly at its introduction of novelties, that it cut down the appropriation and also hastened the publication of the various volumes of census reports to such an extent that it was

not possible to furnish in such reports even an object lesson, showing what sort of population mortality tables we ought to have and could have if we took the trouble to obtain proper data. It has already been stated that more than 25 per cent of our people were then living in districts where proper registration of deaths and in most cases of births had been maintained; consequently, while it was not possible from the returns of such registrations and from the enumeration of the population within such areas, arranged according to sex and age, to deduce a general mortality table or tables applicable throughout the country, it was possible to make at least two such tables, viz, for white males and for white females, representing the actual experience in these registration States and municipalities. Such tables, had they been published with the reports of that census, would, undoubtedly, have done much to encourage both the extension and the improvement of registration and would have been, in many regards, the most promising, as well as already the most valuable, feature of the entire publication, embracing many ponderous volumes.

It is as yet too early to say with certainty what will be the result of the extension of registration areas and the much more extensive and complete statistics of births, deaths, and numbers living available in connection with the census of 1910. The Bureau of the Census had made modest but reasonably complete provision for utilizing to the fullest extent possible the data which it had been able to obtain. For this purpose it caused an investigation of methods of constructing a population mortality table to be made, honoring me with its choice to act as actuary in making such investigation, and it also secured the cooperation of a committee of the Actuarial Society of America, headed by its then president, Mr. John K. Gore, of Newark, N. J., and including some of the most eminent members of the actuarial profession of this country. Preparations were made for compiling the data in the most convenient form to be utilized in the formation of mortality tables, which compiling, however, as regards much of the material, had to be deferred until the same returns had been analyzed and reanalyzed for other purposes. Before this work was completed, and, indeed, as I have learned, before some of the most important parts of it had even been entered upon, the experience of the Bureau of the Census, as regards the census of 1900, was again repeated, viz, that Congress made a sharp and large reduction in the appropriation allowed, which necessarily interfered with the inclusion of new features in the census reports. This must necessarily result in withholding a large part of the most valuable mortality investigations to be published in intercensal reports instead of in the main census report, although it is to be hoped that at least two and perhaps more mortality tables, deduced from the data of white lives resident in the

registration States and municipalities and perhaps lives of other races, so registered, may, notwithstanding the great reduction in the appropriation, be issued, in time to become a part of the census report. This is particularly important because of the encouragement it would give, as regards future censuses, because, in such case, this feature would no longer be a novelty. It must be acknowledged, however, that for convenience in handling and using the same, the publication of population mortality tables and statistics in separate intercensal reports has distinct advantages and what has taken place will not, therefore, be an unmixed evil in case it is possible to make the mortality investigations during the intercensal period and publish the same from time to time.

One admirable piece of work (which has, notwithstanding, very distinct limitations, though that fact is not always recognized) the census has found it possible to perform for some years past, and particularly well since a department of vital statistics has been established. This is the analysis of deaths taking place in the registration districts arranged by causes and by ages or by groups of ages. This analysis may, however, give altogether mistaken impressions concerning what has taken place. It is imperfect, at best, because of the fact that the statistics embrace only the deaths. In consequence, the percentages are those of the number of deaths from one cause to the number of deaths from all causes, but it is obvious that if the number of deaths from one cause were to remain the same and the number of deaths from all causes were to be diminished or increased, these percentages would change and might change pretty widely, because of the variation in the denominator of the fraction. Thus, for instance, it might be made to seem and it is made to seem, without our being able to detect what the fact really is, that the deaths from consumption are greater in proportion in, for instance, one occupation or at one group of ages than in another, whereas the fact really is or may be merely that the total number of deaths is smaller in the first case than in the second case, while the proportion of deaths due to consumption to lives exposed remained stationary.

In other words, in order that there may be correct deductions as regards the proportion of deaths due to the various causes, it is necessary to have the number of lives exposed and to ascertain the ratio of the deaths due to particular causes, not to the total number of deaths, but to the number of persons exposed to death. Then a comparison can be instituted for different groups of ages or for different occupations, or both, between these ratios; or it would be possible, perhaps, to set up some standard of such proportions of deaths due to various causes, as, for instance, among those classes in the population in which the proportion of deaths from all causes

is lowest, and by using this as a standard show whether the proportions of deaths due to the same causes are among other classes distinguished by sex, occupation, race, or what you please, greater or smaller.

From the improvement in the population statistics in the manner described, much is to be expected for the future, not merely in the production of mortality tables of a greater variety, more significant and more adapted to human uses even than those which are now produced in other countries, but also much more is to be expected and that of much greater value in the improvements of hygiene, sanitation, and perhaps even of eugenics, which may reasonably result when all the significant facts are made clearly to appear. If, as a result of such excellent work as can easily be done in these regards, it shall transpire that our most glorious achievements are yet to come instead of already past, we may still have good reason to congratulate ourselves instead of indulging in idle lamentations at our purblindness and folly in the past in ignoring with childlike and even childish confidence in our own superiority, the lessons as regards vital statistics which had been learned by at least one other nation over 150 years ago.

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WORKINGMEN'S INSURANCE AND POOR RELIEF IN GERMANY.[1]

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INTRODUCTION.

The function of poor relief is to give assistance to persons who have been reduced to want by their own deficiencies or by circumstances beyond their control. This relief is given as alms; it is entirely gratuitous, but it imposes certain disabilities (loss of electoral franchise and other honorary rights).

As the development of modern economic and social conditions increased the number of persons whose labor was the only source of income and for whom incapacity or loss of work meant ruin or poverty, the conviction gradually arose that some measures should be taken to anticipate the need of poor relief, and—in case of sickness, accident, invalidity, old age, or death of the head of the family—to give the workingmen and their families, in place of precarious alms, the greater degree of security and comfort to which it was felt that they were entitled. This was the aim of workingmen's insurance in Germany from the moment of its inception, and the aim has been steadfastly pursued in all stages of the accomplishment of the policy and the development of legislation.

Consequently, there have been close organic relations between poor relief and workingmen's insurance from the beginning. A considerable portion of the population, formerly within the scope of the poor laws, has been removed from the jurisdiction of the relieving authorities by the requirements of compulsory insurance and assured under these new conditions a higher standard of provision against misfortune both for themselves and for their families. The number of cases in which relief should be granted was thus notably diminished. The relations between insurance and poor relief result, therefore, in a reduction of the burden of poor relief; in part directly by substitution of insurance, in part indirectly through voluntary charity and philanthropy, which has been aroused more and more by workingmen's insurance and which now find an enlarged field of activity on behalf of the lower classes.

The spirit of social service, which dominates workingmen's insurance, as it does other contemporary social legislation in Germany, has

exerted a powerful influence upon poor relief. The relieving authorities have extended the scope of their activity both as regards the number of persons entitled to relief and the amount of assistance to be given in each case of need. The result has been an increase in expenditure on behalf of the poor, partly in workingmen's insurance, partly in other ways. Obviously, then, the reduction of the burden of poor relief, alluded to above, is not apparent in the statistics of disbursements.

The development of relations between poor relief and workingmen's insurance can not be studied in detail merely from this special point of view of relief and insurance, for many matters of general social policy are involved. A closer examination of this question is particularly urgent, because superficial study of German regulations is likely to lead to erroneous opinions as to the workings of the insurance legislation.[2]

I. ESSENTIAL FEATURES OF THE ORGANIZATION OF WORKINGMEN'S INSURANCE AND POOR RELIEF IN GERMANY.

Now a few words on the legal regulation, the nature, and the scope of workingmen's insurance as compared with poor relief in Germany.

1. *Legal provisions for workingmen's insurance and for poor relief.*—Workingmen's insurance, as now administered in Germany, includes sick insurance, accident insurance, insurance against old age and invalidity, and insurance in behalf of surviving dependents. The entire law of these branches of insurance has been codified in the imperial insurance act (Reichs-Versicherungs-Ordnung) of July 19, 1911. This great statute, comprising 1,805 sections, has not merely made changes in substantive law, but has also created a uniform system of public authorities charged with the supervision of the autonomous disbursing agencies and with the settlement of conflicts. The provincial authorities of this type are the insurance bureaus (Versicherungsämter). As central authority, there is an imperial insurance office (Reichsversicherungsamt) in Berlin. Intermediate between these provincial bureaus and the central office are authorities called supervisory bureaus (Oberversicherungsämter).

Sick insurance is treated in detail in the second book of the imperial insurance act (secs. 165–536), accident insurance in the third book (secs. 537–1225), invalidity and old-age insurance and insurance on behalf of survivors are treated in the fourth book. Accident insurance is not subject to uniform regulations in all occupations, but is divided into three groups—insurance against industrial accidents (secs. 537–914), agricultural accidents (secs. 915–1045), and marine accidents (secs. 1046–1225). The formerly independent provisions for building accidents are now merged in the regulations for industrial accidents.

The imperial insurance act has made important amelioration in all branches of workingmen's insurance. Its chief merit, however, is the introduction of the insurance on behalf of surviving dependents that was projected as early as 1902.

Former legislation upon insurance is repealed by the new statute, with the exceptions of the act of June 30, 1900, upon accident benefits for prisoners, and the act of June 18, 1901, upon accident benefits for officials and persons in the military profession. The latter, however, is amended in part by the military pension act of May 31, 1906.

In one other respect, too, the year 1911 brought to a conclusion noteworthy politico-social aims. The insurance act for salaried employees (Versicherungs-gesetz für Angestellte oder Privatbeamte) of December 20, 1911, applied to the higher grades of employees of every type—the so-called private officials (managers, superintendents in agriculture, industry, trade, and communication, actors, members of orchestras, teachers and tutors, being 16 years of age and in receipt of not more than 5,000 marks per annum), compulsory insurance against occupational incapacity, against old age and in favor of surviving dependents. Here, indeed, we are not dealing with workingmen's insurance, but with social insurance. The new branch of insurance, too, will exert an influence upon poor relief, although far less influence than the workingmen's insurance.

The system of imperial law for social insurance lacks only insurance against unemployement, and this is already in the field of public discussion and actually realized in a few of the larger cities.

Poor relief, in the meaning attached to it in this present discussion, is the public provision for need administered by state or municipal organs. Only occasional reference will be made to the private charity of individuals, voluntary associations and ecclesiastical organizations.

In the German Empire poor relief is regulated in part by imperial statutes, in part by the laws of the several States. The imperial statute of June 6, 1870, on settlement (Unterstutzungs-Wohnsitz) as at present embodied in the act of May 30 1908, regulates the organization of poor unions (Armen Verbände) and defines the circumstances in which each union is obliged to grant relief. This act has at present no force in Bavaria, but recognition of the imperial statute is seriously discussed. The definition of the character and amount of relief and of the means of raising the necessary funds is left to the legislation of the several States. This legal basis of relief consists in Prussia of the executory statute on settlement of March 8, 1871, together with the supplementary law of July 11, 1891; in Saxony, the ordinance of June 6, 1871; in Wurttemberg, the execu-

tory statute of April 17, 1873. In Bavaria, the poor law of April 29, 1869, is still in force, as embodied in the proclamation of July 30, 1899.

The leading principle of German poor legislation is that every subject of the Empire shall be granted relief in the place in which he is then resident, and that in case of permanent impoverishment he shall be relieved in the place in which he had been domiciled for the space of a year without interruption. Relief shall be granted only in case of extreme want and only bare necessities shall be provided. Temporary relief shall be limited to supplying the necessities of life. The insurance stipend is impersonal and general in character; poor relief is individualized, it investigates the needs of the particular person, the cause of distress, the merit of the individual, etc.

Although in principle no matters of general social policy are involved in the administration of poor relief, in practice the meaning of need and the scope of relief are being more broadly interpreted; this is particularly evident in the grant of poor relief to defectives of every type (the weak-minded, the blind, deaf-mutes, cripples, drunkards, etc.). In the modern social development of poor relief there is a heartier recognition of the wisdom of preventing poverty and of protecting the individual whose independence is threatened before there is actual need of relief.

The extent to which the above-mentioned insurance laws assist the poor relief is indicated by the following table which gives the principal causes of poverty in 1885, within the area subject to the imperial law of settlement,[3] as reported by the imperial statistics of poor relief. It appears that relief was granted most frequently on account of sickness (almost one-third of all persons relieved); next in significance come death of the head of the family not due to accident, old age, physical or mental defect.

Persons relieved in the area subject to the imperial law of settlement in the year 1885.

Cause.	Number relieved.	Per cent.	Number per 1,000 inhabitants.
By accident:			
Personal injury	29,330	2.1	0.73
Injury to the head of family	2,623	.2	.06
Death of the head of family	11,801	.9	.30
Not as result of accident:			
Death of the head of family	239,644	17.5	6.01
Sickness of person relieved	388,363	28.4	9.74
Physical or mental defect	167,947	12.3	4.21
Old age	204,078	14.9	5.12
Great number of children	96,832	7.1	2.43
Unemployment	74,077	5.4	1.86
Drunkenness	28,638	2.1	.72
Work shy	16,336	1.2	.41
All other indicated causes	106,309	7.8	2.67
Causes not given	1,369	.1	.03

Similar results were obtained by the individual statistics collected in some of the larger cities in the year 1896–97.[4] Thus there were, for example, in Frankfort on the Main 2,446 permanently needy persons enumerated; the causes were, in 444 cases, sickness; in 469, physical or mental defect; in 443, old age; in 548, inadequate earnings; of 2,630 temporarily relieved persons, sickness was the cause of relief in 1,574 cases.

2. *Population affected by workingmen's insurance and poor relief.*—As regards workingmen's insurance, the persons affected by such legislation are designated by statute or ordinance, and most classes of workmen are required to enroll in accordance with the provisions of the law; for other classes facilities for voluntary enrollment are provided.

The number of persons required to insure is is not equally extensive in the different branches of insurance legislation. Insurance against sickness, invalidity, old age, and insurance on behalf of surviving dependents include much larger groups than accident insurance.

(*a*) Sick insurance is compulsory for all persons regularly or casually employed for hire, as workmen, assistants, journeymen, and apprentices in agriculture, industry, trade, and transportation, servants, salaried employees engaged in industry, actors, members of orchestras, teachers and tutors, and all persons engaged in domestic industry. Compulsory insurance of these last-mentioned persons, of the casual workmen, and of persons engaged in agriculture are the most important innovations of the imperial insurance act of 1911, and these have exerted a great influence on poor relief because these classes of persons were a heavy burden. In the classes of insured persons that are not really laborers, an annual income of 2,500 marks is the upper limit, beyond which compulsory insurance ceases.

(*b*) Accident insurance is compulsory for all workmen and salaried employees (the latter up to an annual income of 5,000 marks) in capitalistic industrial plants (mines, factories of every type, etc.); all persons engaged in dangerous trades (masons, carpenters, locksmiths, joiners, butchers, etc.); all employees on railroads, in the post office, in naval and military shops, in oceanic or inland commerce. The new imperial insurance act has also made insurance compulsory for horsemen and stable keepers and for automobile drivers, whether actually employed or not, so that jockeys, for instance, and chauffeurs are included.

(*c*) Insurance against invalidity, old age, and on behalf of surviving dependents applies to about the same classes of people as sick insurance.

To the groups for whom insurance is compulsory must be added those who are entitled to insure if they so desire. This group is largely composed of persons who would naturally belong to the in-

sured class in respect to their employment, but who are excluded by the amount of their annual income, and the proprietors of small industrial establishments.

The following figures will indicate the number of persons included in the various categories of insurance:

Year.	Population of the Empire.	Number of persons insured against—		
		Sickness.	Accident.	Invalidity and old age.
1885	46,707,000	4,670,959	3,251,000	.....
1890	49,241,000	7,018,483	13,680,000	.....
1895	52,001,000	8,005,797	16,889,000	12,144,500
1900	56,046,000	10,159,155	17,392,000	13,015,100
1905	60,314,000	11,903,794	18,743,000	13,948,200
1906	61,142,000	12,408,706	19,227,000	14,142,700
1907	61,983,000	12,945,242	19,672,000	14,958,118
1908	62,832,000	13,189,599	23,674,000	15,226,000
1909	63,695,000	13,404,298	23,767,000	15,444,300
1910	64,551,000	14,000,000	24,200,000	15,700,000

The proportion of workmen insured to the total number is shown by the following figures:[5]

For every 1,000 hired workmen in the Empire there are—

Insured against—	1885	1895	1904	1906
Sickness	.....	615	764	807
Accident[a]	287	1,297	1,229	1,250
Invalidity and old age	.....	933	920	919

[a] In the case of accident and invalidity insurance it is to be observed that many are enrolled who are not classified as workmen; in accident insurance, persons engaged in agriculture and many proprietors of small industrial establishments; in invalidity insurance, servants.

The number of people who are benefited by workingmen's insurance is considerably greater than the number required or entitled to insure, for in entire branches of insurance relatives and surviving members of the family are provided for. Besides, in the recent reform of the insurance laws, a department of insurance on behalf of surviving dependents has been separately organized.

We have no statistics that indicate the number of people that have thus far participated in the benefits of workingmen's insurance. But some light is thrown upon the subject by the number of cases of sickness which lead to an application for assistance, and there are similar data for the number of disbursements for accident and invalidity insurance, which are all gathered together in the following table. It must be remembered that in cases of sickness different illnesses of the same member during the year are reported as distinct cases; in accident and invalidity insurance various duplications are possible.[6] In all, down to the end of the year 1910, 100,000,000 persons have received a total of 8,400,000,000 marks as insurance benefits for sick-

ness, accident, or occupational incapacity, or as relatives of insured persons. The exact figures to the end of 1909 follow:

Year.	Cases of sickness.	Indemnifications for—		Total number of disbursements for workingmen's insurance.
		Accident insurance.	Invalidity insurance.[a]	
1885	1,956,635	271	.....	1,956,906
1890	2,627,124	127,805	.....	2,754,929
1895	2,943,159	381,229	96,643	3,421,031
1900	4,023,421	690,453	889,643	5,603,517
1905	4,848,610	1,023,244	1,285,821	7,157,675
1906	4,834,108	1,067,448	1,322,705	7,224,261
1907	5,406,076	1,117,213	1,359,399	7,882,688
1908	5,701,180	1,148,547	1,394,444	8,244,171
1909	5,561,006	1,168,071	1,321,340	8,050,411
1885–1909	86,877,890	13,212,144	14,655,615	114,745,643

[a] Compensations paid for contributions are counted as indemnifications.

According to these figures the proportion of cases per 1,000 inhabitants would be as follows:

Year.	Cases of indemnifications for—			Total workingmen's insurance.
	Sick insurance.	Accident insurance.	Invalidity and old age insurance.	
1885	41.8	0.006	.....	41.8
1890	53.3	2.6	.....	55.9
1895	56.6	7.3	1.9	65.8
1900	71.8	12.3	15.9	100.0
1905	80.4	17.0	21.3	118.7
1906	79.1	17.5	21.6	118.2
1907	87.2	18.0	21.9	127.1
1908	90.7	18.3	22.2	131.2
1909	87.3	18.3	20.8	126.4

For purposes of comparison it may not be out of place to give the figures for the number of persons in receipt of poor relief as reported by the imperial inquiry of 1885:

	Persons in receipt of relief.		Number per 1,000 inhabitants.
	Families.	Persons.	
Prussia	528,257	953,292	33.7
Bavaria	86,098	151,550	28.0
Saxony	53,190	88,602	27.8
Wurttemberg	37,795	63,320	31.7
Baden	39,508	68,496	42.7
Alsace-Lorraine	39,047	73,489	47.0
Bremen	4,520	11,329	68.4
Hamburg	28,738	51,089	96.6
German Empire	886,571	1,592,386	34.0

3. *Disbursers of insurance and of poor relief.*—The disbursers of insurance are sick funds (Krankenkassen), occupational societies

(Berufs-Genossenschaften) and institutions for invalidity insurance (Invaliden-Versicherungs-Anstalten). These organs are not official establishments with bureaucratic organization; they are independent associations with complete authority over their internal organization, governed by the provisions of their statute and merely supervised by the state. They are public corporations with a large measure of self-government. The disbursing committees are organized by representatives of employers and of employees, and all the business is transacted by authorized delegates. The relative influence of employers and employees in the management is proportioned to the amount contributed to the funds of the association. Accordingly, the workingmen are the predominant force in the administration of the sick funds, whereas in accident insurance the entire management of affairs is left to the employers. In societies organized to direct invalidity and old-age insurance and insurance in behalf of surviving dependents, both classes are equally represented in accordance with the amount of the contribution to expenses.

For sick insurance there are as general sick funds, the municipal sick funds and the rural sick funds established for local districts. To these organizations belong all insured persons who are not enrolled in some special society, either in one of the factory sick funds, in one of the gild societies for masters of a craft, or one of the journeyman miner's societies. No insured person is required to belong to such a voluntary society, as he may at pleasure enroll in a supplementary society (Ersatzkasse) which is a compliance with the law. These supplementary societies are perfectly free workingmen's benefit associations. Sick insurance in Germany, consequently, is not a system of societies in which particular workmen are forced to join a particular society; the workman is merely compelled to enroll in some society not precisely designated by law.

(*a*) Municipal sick funds are organized in pursuance of resolutions by communal unions. The administrative organs (the board of directors and the committees) consist of employees and employers, in the proportion of 2 to 1.

(*b*) Rural sick funds are set up in the same fashion. They include agricultural laborers, servants, pedlar's assistants, and persons engaged in domestic industry. All other persons, who do not belong to a special society, must enroll in the municipal sick fund. The administration of the rural sick fund is in general the same as that of the municipal society, but the communal union which establishes the rural sick fund has a decisive influence over the direction of affairs.

(*c*) Factory sick funds can be established by a designated number of workmen in a particular trade—in agriculture 50 is the minimum number, otherwise 150. This form is particularly favored by large

establishments and factories, because it makes it possible to take account of the particular circumstances of the enterprise and to attract a loyal body of operatives by the guaranty of supplementary payments. The administration of the fund is similar to that of a rural society. The employer has a decisive influence over the management, but in the board of directors and in the committee—as also in the rural sick funds—the workmen have a two-thirds majority.

(*d*) The guild societies are of no great significance. The journeymen miners' societies, however, play a dominant part in the mining districts.

Accident insurance is administered by 114 trade associations in which the employers are enrolled on the principles of mutual insurance. There are 66 industrial societies and 48 related to agriculture or forestry. For the insurance of persons employed in industries managed by the States and municipalities there are special executive authorities, of whom there were 545, in 1909, 210 imperial and State authorities for industries directed by the Empire or by the several States (including 55 for agriculture and forestry), 335 provincial and communal authorities. There is, in addition, a special branch of the Marine Society for the insurance of certain vessels. The insured have no share in the administration of the funds of these societies and they contribute nothing. But they do participate in the publication of rules for the prevention of accidents, in the decisions of the insurance authorities upon particular accidents and in general supervision of the authorities.

For the administration of insurance for invalidity, old age and surviving dependents, institutions are formed on a territorial basis and organized as corporations with powers of self-government. In these directorates employees and employers are represented in equal numbers. In 1909 there were 41 (31 insurance institutions, 10 insurance funds).

The disbursers of poor relief are everywhere the communal unions. Except in Bavaria, there are two distinct authorities, the communal and the provincial poor unions. The poor, however, have no voice in the management. The communal poor unions, which consist of communes or rural districts, are the usual disbursers of relief, and the provincial unions, which include a number of communal unions, are in reality of subsidiary importance. The modern idea, that poor relief is not merely a communal burden but a general duty of society as a whole, finds expression less in these more extended provincial unions than in the statutory allowances made by the States and certain large public associations to communes overburdened with the weight of relief expenditures (for example, contributions in Bavaria by the provinces and districts).

4. *Character and conditions of benefits from insurance and poor relief.*—The benefits from all branches of workingmen's insurance are paid in fulfillment of a legal obligation toward the recipient, whether the obligation is based directly on statute or merely upon the by-laws of the disbursing authority. The recipient has a legal claim upon the benefit, and the fulfillment of the obligation can be required by process of law.

It is otherwise with poor relief. The destitute person does not stand in the relation of a contracting party to the poor-law authority; he is merely a recipient of charity with no legal right nor any means of compelling the authorities to grant relief. The office of the poor law union stands in no direct legal relation to the destitute; it is subject merely to administrative supervision to insure the faithful performance of its official functions. The eleemosynary character of poor relief imposes certain civil disabilities upon the recipient. Poverty is a disgrace. The disabilities concern chiefly electoral rights in the Empire, in the State, in the commune and in the church. Other curtailments of civil rights affect the service as a juror, membership in the industrial and commercial courts and, finally, the acquisition of settlement.[7]

The severity of these legal disabilities of the poor involving diminution of their civil rights has been modified in practice.[8] The authorities hold that it does not constitute a grant of poor relief if exemption from the school tax is granted, or school supplies distributed gratuitously, or legal counsel given on the ground of poverty, or grants given from charitable foundations, or general assistance given because of some natural calamity such as a flood, or a crop failure, or distress due to an epidemic. Since 1909 another moderation of the old law has been made by statute. The imperial act of March 15, 1909, on the effect of receipt of poor relief upon civil rights, provides that assistance involving loss of rights by reason of imperial statute shall no longer be deemed poor relief. This applies to grants given on account of sickness, institutional care given a relative on account of physical or mental defect, grants in behalf of young men for education or acquisition of a trade, other types of relief given as a single grant to alleviate temporary distress, and finally all grants which are ultimately repaid. By a special resolution of February 17, 1909, the Reichstag asked the imperial chancellor to urge the several States of the Empire to adopt these principles of imperial legislation. As a result, some of the States have set aside their laws imposing disabilities upon recipients of poor relief, as Bavaria has by the act of April 4, 1910.

Another fundamental difference between insurance and poor relief is shown by the conditions in which assistance is given. In order to enjoy the benefits of insurance certain typical circumstances are assumed: A specific occupation, sickness, accident, invalidity, a certain age, death of the head of the family, and in part the payment of contributions, which in some cases, especially invalidity and insurance on behalf of surviving dependents, entitle the recipient of assistance to a stipend proportionate to the length of time that contributions have been paid.

On the other hand, the basis for a grant of poor relief is proof of individual need and of the incapacity of the applicant to supply his essential wants. The destitute person must therefore submit to a searching inquiry into all his personal relations, both economic and legal, however distasteful this inquiry may be.

5. *Expenditure for insurance and for poor relief.*—The expenditure for insurance is indicated by the following figures representing sums expended for workingmen's insurance:

The figures will show at once what the particular city spends in the indicated type of relief, but for comparative study the figures are of limited value, as the Charlottenburg authorities admit. One city includes in expenditure for the poor the cost of administration or contributions to welfare unions, and another does not include these items; one city records with expenditures for paupers the cost of caring for babies, and another does not; one city will have endowed orphanages and hospitals which do not lay a charge upon their budget, whereas other cities must maintain similar institutions at considerable expense. One city does not count the cost of caring for sick paupers if they are cared for in municipal institutions, another will count the cost of a relatively small portion of the attention given, and a third will actually give the costs of care in the municipal hospitals. One city will care for its sick in costly modern institutions of its own, elsewhere private institutions with low costs of maintenance are available. The same is true of the accommodations for insane paupers; those of one city will be cared for at a minimum expense in an institution erected by the Province; in other cities municipal institutions render the same service at a distinctly higher cost. To these differences must be added the different economic conditions, the standards of living in the various places, which exert a considerable influence upon the cost of poor relief (differences in the prices of necessities, rents, etc.).

In addition, the varying composition of the population in different cities as regards wealth renders comparison of expenditures for poor relief difficult.

6. *Provision of funds for insurance and poor relief.*—Against the expenditure of 8,400,000,000 marks for workingmen's insurance from 1885–1909 must be reckoned the income of 10,700,000,000 marks for the same period.

These receipts are as follows:

[In thousand marks.]

Year.	Total income.	Contributions of—		Imperial contribution.	Interest and other income.
		Employers.	The insured.		
1885	66,412.7	18,373.8	45,119.0	.....	2,920.0
1891	264,067.1	124,880.0	122,548.3	6,049.8	10,589.0
1895	341,527.4	154,747.4	140,809.4	16,933.2	29,037.5
1900	485,654.6	212,670.5	190,605.4	30,761.8	51,617.0
1905	717,400.1	325,570.8	268,338.2	47,350.8	76,140.2
1906	769,757.0	349,331.6	292,400.3	48,757.6	79,267.5
1907	817,232.9	367,145.3	314,594.7	49,620.6	85,872.3
1908	859,426.6	388,721.6	328,431.4	50,521.8	91,751.8
1909	893,684.8	414,173.9	342,781.6	51,500.6	85,228.7
Total (1885–1909)	10,685,060.9	4,817,530.4	4,269,977.4	587,227.0	1,010,326.1

The income is received from different sources in the various branches of insurance, and in various ways even in the particular branches. It is a fundamental principle that the burdens of insurance shall be shared by employers and employees and by the German Empire in part in the case of invalidity insurance and insurance in behalf of surviving dependents; the burden actually rests upon great associations with adequate means.

This principle is entirely foreign to poor relief. The resources for poor relief are derived entirely from the communes; they are raised in the form of taxes, and are thus borne by society as a whole. Here we must note the obligatory character of poor relief in Germany, in comparison with the French system which makes relief compulsory only in a restricted sense and contemplates additional taxation only in so far as bequests, charitable foundations, and private contributions are inadequate for the maintenance of the institutions and bureaus. It is obvious that because of this incomplete organization of public relief private charity is particularly important in France.

7. *Course of appeals in insurance and poor relief.*—To touch briefly upon the question of appeals, it is uniform for all branches of insurance.

The granting or denial of assistance is determined by the disbursing authority (sick fund, trade association, invalidity-insurance institution) and by the properly constituted representative of the association, usually by the board of directors. Against the decision of the disbursing authority an appeal can be made to the insurance

bureaus (Versicherungsämter), to the supervisors of insurance (Oberversicherungsämter), and finally the imperial insurance office. The workman has thus—as also the disbursing authority—at least two, and at times three, neutral appellate bodies in which the equal representation of employers and employees offers every guaranty of just decisions.

In respect to poor relief, there can be no complaint on the part of the destitute, because of the nature of the assistance given, and consequently there can be no appeal; here the only interference could come from the general administrative officers.

8. *Reciprocal relations of insurance and poor relief.*—Finally, it is necessary to note the reciprocal legal relations between poor relief and workingmen's insurance. If the relieving authority of the poor law steps in prematurely or finally, in cases for which the insurance authorities are responsible, the poor union can demand compensation to the extent of the legal claims of the recipient of relief.

II. REDUCTION OF THE BURDEN OF POOR RELIEF BY WORKINGMEN'S INSURANCE.

As was mentioned earlier, the most frequent causes of poverty are sickness, death of the head of the family, invalidity, and the disabilities of old age. Now in the year 1910, under the workingmen's insurance laws, 14,000,000 persons, or about 80 per cent of all wage earners, were insured against sickness, 24,200,000 persons, or 125 per cent[9] of all wage earners, were insured against accident, 15,700,000 persons, or 90 per cent of all wage earners, were insured against invalidity and old age; and during the period 1885–1910 the respectable sum of 8,400,000,000 marks ($2,100,000,000) was paid out to workingmen under the insurance law as benefits to assist them in cases of sickness, accident, invalidity, and old age.

The recipients belong, in nearly all cases, to the least prosperous classes. It is the especial merit of workingmen's insurance in Germany that it includes the great mass of wage earners and precisely those strata that are most deficient in foresight. The French system, on the contrary, founded on the voluntary principle and requiring the workman to take the initiative and to bear the burden alone, usually includes only the élite of the working class. If workingmen's insurance did not assist these classes, which the German system is thus able to reach, they must needs have become pensioners of the poor law. Thus it will be evident without further proof that the burden of poor relief is reduced in no small measure by workingmen's insurance.

[In thousand marks.]

Year.	Total.	Benefits paid.	Analysis of benefits.		Administrative expenses.
			Sickness.	Other causes.	
1885	58,792.0	54,159.3	52,663.6	1,495.7	4,632.7
1890	124,685.4	112,702.9	93,003.9	19,699.0	11,982.5
1895	231,841.4	208,635.8	119,279.4	89,356.4	23,205.6
1900	389,973.3	355,003.4	184,862.0	170,141.4	34,969.9
1905	603,013.2	551,685.0	275,464.8	276,220.2	51,328.2
1906	631,726.8	576,377.8	287,633.1	288,744.7	55,349.0
1907	685,887.7	626,636.6	324,177.7	302,458.9	59,251.1
1908	734,702.0	670,411.4	355,510.6	314,900.8	64,290.6
1909	762,161.1	693,495.9	368,975.7	324,520.2	68,665.2
Total (1885–1909)	8,441,894.4	7,674,289.0	4,211,445.2	3,462,843.8	767,605.4

From 1885 to 1909 there was a total expenditure of 8,441,894,400 marks, distributed as follows:

	Marks.
All classes of benefits	7,674,289,000
For sickness	4,211,445,200
For other causes	3,462,843,800
Administrative expenses	767,605,400

In these tables expenses for sickness include, in the case of sick insurance, the so-called costs of sickness (medical attendance, medicines and curatives, sick benefits, maternity benefits, hospital convalescence, or funeral expenses); in case of accident insurance, expenditures for treatment, assistance during the period of disability, hospital expenses and benefits paid to relatives; in case of invalidity insurance, expenses for treatment and sums granted for special reasons. Under "other causes" are included: Any expenditure not already enumerated in connection with sick insurance; in cases of accident insurance, the grants to the injured person or to surviving dependents; satisfaction of claims of citizens, foreigners, and widows, and funeral expenses; in the case of invalidity insurance, the pensions for invalids and aged persons, as well as compensations for contributions and the care of the asylum for the invalids.

The average daily expenditure of workingmen's insurance authorities in behalf of the insured reaches at present 2,000,000 marks.

In regard to the various branches of insurance it is to be observed:

In the case of sick insurance the period of assistance was extended in 1903 from 13 to 26 weeks, so that since that time the relief granted as sick insurance extends without interruption until invalidity insurance can be claimed. The benefits are of two kinds, those due by reason of legal requirement (particularly medical attendance, sick benefits, maternity benefits, funeral expenses), and the voluntary supplementary grants which include assistance given the family and additions made to the other payments.

Accident insurance entitles the insured to benefits during illness and contingent rights to benefits for surviving dependents. The trade association can furnish hopsital (sanatorium) treatment instead of sick benefits upon payment of benefits to the family.

Invalidity insurance entitles persons to pensions in case of old age or invalidity and, in addition, preventive institutional treatment may be given. The pensions are not usually sufficient to maintain the individual, so that they frequently fail to prevent the person from becoming a charge upon the poor funds.

Poor relief consists in most cases of direct provision for needs, which must be made when other authorities are not required to render assistance. The character and amount of relief is prescribed by the law of the particular State; the Prussian act requires shelter, the necessities of life, care in case of sickness, and decent burial.

The relative expenditure for poor relief and workingmen's insurance in a somewhat smaller area, may be studied in the corresponding figures for Bavaria. There was expended in Bavaria (in marks):

Year.	For poor relief.		For workingmen's insurance.	
	Total.	Per 100 inhabitants.	Total.	Per 100 inhabitants.
1897	9,442,955	159.1	19,113,974	322.1
1900	10,368,387	168.6	26,024,401	423.2
1902	11,286,433	178.9	30,099,341	477.1
1904	12,199,398	188.7	37,698,740	583.3
1906	13,296,000	202.3	41,383,556	629.8
Total (1897–1906)	111,375,955	177.9	301,094,106	480.9

On account of the great significance of the attention now given to poor-law administration in the great cities, we should examine the statistics of expenditure for the relief of paupers and orphans in German cities having over 100,000 inhabitants,[10] according to the figures for 1910, prepared by the relieving authorities of Charlottenburg.

Expenditures of various German cities for the relief of paupers and orphans in 1910.[a]

Number.	City.	Population Dec. 1, 1910.	Actual total expenditure for paupers and orphans in the fiscal year 1910.	Expenditure per capita.		Compensations for expenditure received from communal and district unions, sick funds, occupational societies, district insurance societies, and other responsible parties (private persons) in 1910.		Municipal hospitals.		
								Total expenditure in 1910.	Compensations for treatment of sickness received from sick funds, etc., paying patients, and other responsible parties.	
				1907	1910		Per cent of expenditure.			Per cent of expenditure.
			M.	M.	M.	M.		M.	M.	
1	Berlin	2,070,695	[b]15,651,325	6.44	7.56	1,084,841	6.93	16,094,693	3,345,746	20.79
2	Hamburg	931,035	7,709,240	7.53	8.28	739,380	9.59	8,940,000	3,768,500	42.15
3	Munchen	596,467	3,178,798	4.67	5.33	159,249	5.01	3,567,433	2,398,254	67.23
4	Leipzig	589,844	3,868,567	7.22	6.56	845,142	21.85	1,797,141	1,020,559	56.79
5	Dresden	548,308	3,305,722	5.07	6.03	[c]514,752	15.57	2,852,887	1,155,450	4.05
6	Coln	516,540	3,321,212	[d]3.22	6.43	416,476	12.54	2,829,885	1,609,502	56.88
7	Breslau	512,105	2,107,812	3.49	4.12	139,577	6.62	1,728,503	[e]416,838	24.12
8	Frankfort on the Main.	414,000	3,085,527	6.62	7.45	403,027	13.06	2,678,166	653,701	24.41
9	Dusseldorf	358,728	1,811,947	5.71	5.05	226,555	12.50	1,370,266	738,807	53.92
10	Nurnberg	333,142	1,340,687	3.46	4.02	133,496	9.96	1,048,269	794,733	75.81
11	Charlottenburg	305,977	2,137,281	5.88	6.98	396,394	18.55	1,267,735	731,355	57.69
12	Hanover	297,300	1,408,183	4.32	4.74	184,121	13.08	750,131	456,984	60.92
13	Essen on the Ruhr	294,671	1,228,104	3.67	4.17	224,279	18.26	756,691	300,252	39.68
14	Chemnitz	287,802	884,483	3.17	3.07	175,994	19.90	1,174,774	359,710	30.62
15	Stuttgart	286,218	1,191,062	5.68	4.16	205,100	17.22	1,128,393	664,986	58.93
16	Magdeburg	279,629	[f]1,114,466	4.56	3.99	218,197	19.58	1,115,413	(g)	.....
17	Konigsberg	246,003	1,041,324	4.61	4.23	76,574	7.35	431,148	196,813	45.65
18	Bremen	244,875	1,683,007	5.58	6.87	385,916	22.93	177,459	(g)	.....
19	Rixdorf	237,369	598,884	2.09	2.52	195,092	32.58	586,066	327,476	55.88
20	Stettin	236,113	976,192	3.59	4.13	89,532	4.45	1,033,591	522,403	50.54
21	Duisburg	229,478	829,318	3.41	3.61	141,830	17.10	107,521	6,662	6.20
22	Dortmund	212,743	1,032,903	3.40	4.86	172,419	16.69	908,470	438,569	48.28
23	Kiel	211,643	1,079,219	6.23	5.10	248,873	23.06	378,333	106,412	28.13
24	Mannheim	193,928	1,215,263	5.32	6.27	164,876	13.57	834,052	314,585	37.72
25	Halle	180,551	842,104	4.14	4.66	136,930	16.26	.....	.....	.....
26	Strassburg	178,891	886,753	3.12	4.96	248,261	28.00	1,541,567	962,549	62.44
27	Schoneberg	172,884	581,123	2.41	3.36	158,796	27.33	665,837	380,362	57.13
28	Altona	172,634	839,497	4.57	4.86	253,711	30.22	161,166	40,866	25.36
29	Danzig	170,347	891,740	4.60	5.23	174,978	19.62	519,289	278,996	53.73
30	Elberfeld	170,118	954,756	4.80	5.61	124,599	13.05	467,274	322,327	68.98
31	Gelsenkirchen	169,534	456,851	2.17	2.69	90,798	19.87	.....	.....	.....
32	Barmen	169,201	596,284	3.38	3.52	108,506	18.20	339,059	216,944	63.98
33	Posen	156,696	865,674	4.46	5.52	63,919	7.38	530,884	361,261	68.05
34	Aachen	156,145	1,090,036	5.93	6.98	179,455	16.46	549,811	396,910	72.19
35	Cassel	152,500	557,733	2.92	3.66	77,758	13.94	.....	.....	.....
36	Braunschweig	143,552	685,005	3.71	4.77	.....	.....	.....	.....	.....
37	Bochum	136,829	505,513	3.02	3.69	111,144	21.99	.....	.....	.....
38	Karlsruhe	134,302	580,902	2.55	4.33	114,613	19.73	780,394	337,014	43.19
39	Krefeld	129,412	659,777	4.23	5.10	59,881	9.08	283,053	135,788	47.97
40	Plauen	121,272	303,498	.....	2.50	72,664	23.94	377,650	137,228	36.34
41	Erfurt	111,461	337,055	3.02	3.02	69,870	20.73	262,430	71,760	27.34
42	Mainz	110,624	503,819	.....	4.55	93,182	18.50	289,926	259,025	89.34
43	Wilmersdorf	109,716	213,833	1.42	1.95	56,980	26.65	.....	.....	.....
44	Wiesbaden	109,033	495,953	3.66	4.55	86,296	17.40	644,739	320,303	49.68
45	Saarbrucken	105,097	394,282	.....	3.75	84,694	21.48	.....	.....	.....
46	Augsburg	102,454	430,927	.....	4.21	66,055	15.33	436,047	326,686	74.92

[a] Official report of the relieving authorities of Charlottenburg. 1911. No. 11.
[b] Not including the cost of care of sick paupers in municipal hospitals.
[c] Includes compensations from sick funds in pursuance with sec. 57 of the law on sick insurance, as separation is not possible.
[d] Does not include expenditure for institutional relief in municipal institutions, which amounted to 838,424 marks in 1910.
[e] In these sums are included all costs of treatment collected from sick funds.
[f] Includes a workhouse for the poor, with 70,857 marks, and an educational institution, with 12,593 marks.
[g] No information.

This fact will be more obvious if one considers the chief items of this expenditure.[11]

	1909	1910	1885–1910
Sick insurance:	*Mark.*	*Mark.*	*Mark.*
Total benefits paid	342,200,300	357,391,300	4,351,764,800
Medical treatment	75,378,400	80,702,900	925,818,500
Medicine and appliances	47,772,600	51,705,100	667,553,200
Benefits to members	145,825,800	146,161,700	1,882,339,700
Benefits to relatives	4,676,400	5,713,400	45,233,300
Maternity benefits [a]	6,112,700	6,439,400	70,177,100
Hospital care, convalescence	49,096,300	53,098,400	563,694,100
Funeral expenses	8,287,900	8,263,300	130,300,300
All other expenditures (transportation of sick, etc.)	5,050,200	5,306,700	66,648,300
Accident insurance:			
Total benefits paid	162,266,100	164,425,400	1,972,734,300
Treatment (medical attendance, medicines and appliances outside a hospital, appliances such as crutches, etc.)	3,701,800	3,697,700	48,407,200
Maintenance in interim (in the first 13 weeks after the accident, during which sick insurance is legally paid)	933,200	1,098,600	11,689,700
Hospital treatment	5,031,700	5,077,800	72,292,600
Benefits paid to relatives [b]	1,428,900	1,425,200	19,739,400
Benefits paid to injured persons	117,418,000	118,026,900	1,422,166,300
Settlements with injured persons (natives)	1,792,000	1,880,000	14,317,600
Funeral expenses	707,400	674,600	11,087,500
Benefits to surviving dependents (widows, orphans, etc.)	29,961,100	31,246,200	355,605,000
Settlements with widows	1,013,500	1,018,600	13,232,700
Settlements with foreigners	278,500	279,600	4,195,800
			1891–1910
Invalidity insurance:			
Total benefits paid	189,029,500	196,825,500	2,068,432,100
Treatment	19,346,200	21,102,100	152,571,700
Extraordinary benefits to relatives and other unusual charges	1,383,800	1,535,200	7,649,100
Care in the home for invalids	613,400	770,700	3,668,400
Benefits paid to invalids	139,257,300	145,588,600	1,331,596,100
Benefits for sickness [c]	3,458,800	3,387,700	29,248,500
Old age benefits	15,549,500	15,010,800	438,528,900
Contributions repaid on account of—			
Marriage	5,813,700	5,898,400	72,749,400
Accident	51,800	48,400	486,600
Death	5,555,000	3,483,200	31,933,100

[a] Since 1904, includes maternity benefits before childbirth.
[b] The relatives of an injured person taken to a sanatorium receive the same benefits as are granted in case of death by accident.
[c] Paid to persons temporarily incapacitated, who were incapable of pursuing their calling for 26 weeks without interruption, for the period of incapacity exceeding 26 weeks.

Of the resources of institutions for invalidity insurance, amounting to 1,700,000,000 marks at the end of the year 1911, 959,000,000 marks were spent for general purposes as follows:

	In million marks
For philanthropic institutions owned by the disbursers of insurance for the treatment of general diseases, especially tuberculosis	69
Loans for building workingmen's dwellings	342.3
Loans for building homes for unmarried people (hospices, lodging houses, etc.)	19.9
For general-welfare work	482.5
Distributed as follows:	
For building hospitals, convalescent homes, sanatoria and all other treatment of sick persons	105.6
For the furthering of the public health (building of baths, waterworks, canalization, etc.)	165.0
For popular education and instruction	81.5
Other welfare work	130.4
Grants to meet the need for rural credit	114.2

Thus there are expenditures to defray the cost of sickness (doctors, medicines, hospital care), for maternity benefits (support before and after delivery), for care of convalescents and for funeral expenses. In case of accident, there are benefits for the injured, for his surviving dependents, and for medical attendance that is designed not only to restore the person to health, but to render him again capable of earning a livelihood. There are expenditures for benefits in case of protracted illness involving temporary incapacity, for invalidity and old age, and for maintenance in sanatoria and asylums.

These expenditures are not restricted to the insured, they include also special sick benefits, benefits for relatives and for surviving dependents which assist the family, or the widow and orphans, and in some sick funds benefits may be secured for sick relatives of the insured person.[12]

The payments are by no means merely temporary, but are often granted for months, years, and at times for life.

The amount of the benefits granted is already great enough completely to allay the want in the particular instance. But probably the amount will be increased considerably in the course of time, as in the case of the invalidity benefits.

Furthermore, this is not merely an assistance rendered when the need becomes urgent, at the time of sickness, accident, or invalidity. There is a more energetic effort to deal with the causes of these great interruptions of productive activity, and to this end there is a more comprehensive preventive activity among the insurance authorities, so that workingmen's insurance has become the foundation and cornerstone of our preventive social hygiene.

By means of a carefully organized body of workingmen's insurance statistics, which indicate the course, cause, and consequences of cases of sickness, invalidity, and industrial accidents, the principal dangers which threaten the life of the workman become known, and the manner in which these evils can be most successfully attacked is made evident. There follows, in consequence a systematic campaign against tuberculosis, drunkenness, venereal diseases, the lack of workingmen's dwellings, unemployemnt (guaranty of sufficient work to preserve the claim to insurance by means of labor exchanges), schooling of the workingmen and their families in social hygiene, enlightenment of the insured by regular lectures, etc. This campaign is being carried on in part by workingmen's insurance alone, in part in conjunction with other organs of public welfare.

What we gain in this way is obvious. No more merely relieved sick, injured, invalids, but persons sound in body and again capable of work. Where in the past death occurred, life is now maintained; where formerly the man became a cripple for life, he is now enabled

to preserve the full use of his limbs. Thousands who would otherwise be wholly or partially incapacitated now become again industrially capable. The working population of to-day is much less exposed to the dangers of sickness, invalidity and accident, and seems to possess greater powers of resistance, the coming generation is growing up healthier and stronger from the beginning. With the improvement of the health of the insured, there will be a postponement of invalidity, if not entire prevention of such disability. Other strata of population, too, are more completely guranteed against contagion and brought up to a higher standard of health. This increase in vital power [13] adds to the labor force and to the creative powers of the individual and of the nation. The number of cases in which poor relief would be necessary is considerably diminished and, in addition, much distress is entirely prevented.

Furthermore, the ethical character of insurance is not to be forgotten in this connection. The workman is not obliged to ask for this assistance as he used to beg for alms, thereby losing his social honor and certain civil rights. He can demand this aid as a well-earned right, as compensation for the contributions he has made and the services he has performed; he can demand it as a sort of official pension. His personal independence thus suffers no diminution by the acceptance of these insurance benefits. He retains all his civil rights. His personal feelings and his social pride are not injured, but rather given new strength. The legal guaranties of maintenance given him by workingmen's insurance against sickness, invalidity, and old age place him in the class of those who have. Furthermore, the schooling in self-government, which is gained in the organization of insurance against sickness and invalidity, increases the capacity and desire of the workingmen to do many things for their own welfare.

The workingmen are induced to help themselves in many cases where the organized insurance is not sufficient, either by availing themselves of the opportunities offered by the authorities of voluntarily increasing the amount of their insurance, or by joining independent institutions for the payment of such additional premiums, so that they may not be obliged to ask for poor relief in any contingency. Furthermore, relatives are more inclined to make supplementary contributions in order to prevent the person in need from becoming a charge upon the poor funds. Unions, charitable foundations, and private philanthrophy are all active in the same direction.

The question of charitable activity plays an important rôle in connection with workingmen's insurance. The social conscience, the feeling of social responsibility and solidarity as it is incorporated

in workingmen's insurance, the feeling that there is an obligation to assist the lower classes and to help them toward a high level of economic and social development, all these sentiments are strengthened as well as the sense of what is desirable and practical. Stimulated and quickened by this development of workingmen's insurance, humanitarianism and the spirit of social sympathy are everywhere in evidence. Foundations, bequests, direct support of paupers by private persons, the permanence of associations, have all become increasingly significant.

Self-help and philanthropy thus manifest themselves in a variety of ways that would scarcely be possible without the foundations of workingmen's insurance. The ideas of workingmen's insurance are developed and embodied in the most varied forms. For example, private associations supplement the efforts of the insurance authorities in cases of sickness; these associations are sometimes formed by workmen (trades-unions, workingmen's friendlies), sometimes they are general philanthropic associations (as, for example, the association for the care of sick workmen in Leipzig, the Central Institute for private relief in Frankfort on the Main, the association for relief in the homes, spread throughout Germany, the Red Cross Society, particularly its branch for recreation grounds). Accident insurance has been extended beyond its legal limits by the Red Cross Society and the Humane Society (Rettungsgesellschaft) of Berlin; an association formed by these societies, the "Union for provision of first aid to the injured in Berlin," cares for an adequate number of stations for first aid (accident stations) in Berlin and its suburbs, regulates the ambulance service and the relations between the authorities and the hospitals, etc.

A special committee of ladies undertakes to assist, with money or otherwise, the injured person or his family immediately after being brought to the accident station. Persons injured in accidents who have regained their full capacity for work after treatment are helped to find new employment by the Association to Assist Persons Injured in Accidents. For those who have become invalids by reason of tuberculosis there is, in addition to the assistance provided by law, the central German committee for the campaign against tuberculosis, which has already found an extension in the associations for the erection of pulmonary sanatoria for the middle classes. For widows and orphans, as well as for the unemployed, provision is made by the funds of workingmen's associations and unions. Children who are in need are assisted by workingmen's insurance only in exceptional cases, but they receive the necessary aid in children's homes, vacation colonies, forest schools (Waldschule), soup kitchens, homes for boys or girls, Pestalozzi-Fröbel houses, infant's hospitals, homes for

cripples, all maintained by special associations. We should mention here the German central bureau for the care of youth, the associations for the campaign against venereal diseases, against alcoholism, against infant mortality, the German Association for Social Hygiene, the Workingman's Dwellings Association, the Association for Workingmen's Homes, maternity hospitals, people's kitchens, the Association for Popular Culture, social museums, popular cultural lectures on art, information bureaus on matters pertaining to workingmen and many other unions or associations designed to make possible for workingmen a better mode of living both materially and spiritually, to give them recognition as moral and social equals and to make easier for them the transition to the standard of living, modes of thought and spiritual ideals of the middle classes. Thus assistance for the weak and sickly goes hand in hand with assistance of the healthy, in this attempt to increase the numbers of the healthy portion of the population. In this branch of welfare work, in the interest of the perpetuation of our species and the future of our nation, recently brought forward both by social hygiene and biology, one is tempted to use the words of the present imperial chancellor, von Bethmann-Hollweg (in the sitting of the Prussian House of Deputies of Apr. 6, 1905):

> Our object is to raise up a generation that is not weakened by neglect of hygiene, but is strong of body and fitted for the strain of labor and of life; and in this corpus sanum we would develop a mens sana, a mind which can not rest satisfied with the cultural attainments of the lower schools, but which naturally finds a life task in developing a nation-wide strength of character, and does not lose the necessary and justifiable love of life and pleasure but finds its pleasure in a more intense though more spiritual form.

Everything that thus contributes toward furthering the ends of workingmen's insurance, guaranteeing or increasing the effectiveness of these efforts, everything that tends to increase industrial and military strength or to encourage a spirit of economic independence in the people, will result in a diminution in the burden of poor relief. This diminution, too, is brought to the consciousness of the relieving authorities in many ways.

We can, indeed, give no statistical indication of the extent of this diminution of the burden of relief by reason of workingmen's insurance. Many things besides workingmen's insurance have had an influence on expenditures for poor relief.[14] I will mention here merely the relative leniency or severity of administration, extension of relief to new classes, the increase of population, and the general increase in the cost of living. It is not possible to distinguish the effects of these different factors, and peculiarly difficult to isolate the influence of workingmen's insurance by any process of elimination

Consequently, we are necessarily thrown back upon the results of special observations, which have been made with this purpose by the relieving authorities.

Such inquiries were instituted about 15 years ago by the Association for Poor Relief and Public Welfare and by the Empire. Both investigations have shown [15] that even then workingmen's insurance accomplished much good, and that, even if it could not be statistically shown, there was a notable reduction in the burden of poor relief. This reduction is generally founded upon indications that the actual increase in the number of persons receiving poor relief and the increase in expenditure would both have been far greater if there had been no laws on workingmen's insurance, for the most of the persons so assisted would otherwise have been a charge upon the poor funds. This effect is particularly noticeable with respect to sick insurance and insurance against invalidity or old age; it is less evident in connection with accident insurance because the earlier legislation on liability for accident had already provided some aid and the poor funds were seldom called upon for relief of the less serious cases of accident.

To-day, almost 30 years since the application of the workingmen's insurance laws, its influence upon poor relief, both out relief and relief granted in institutions, is naturally much more considerable.

Some indication is given by the amounts of the compensations for care received by the relieving authorities from the organs of workingmen's insurance, on account of the not infrequent premature grants of relief to persons who have a claim on the insurance funds. Some figures have already been presented above in the tables on page 24. Additional information is given in the following tables, from materials placed at my disposition by the various cities. From them it is possible to draw some inferences as to the extent of the reduction of poor-law expenditure by workingmen's insurance, for in the absence of the latter authority most of the relief granted must needs have been a final charge upon the relief funds:

Compensations paid to poor-law authorities.

Year.	By sick funds (sec. 57, par. 2, sick insurance act).		From trade associations.	From invalidity insurance institutions.	Benefits received on the account of persons permanently maintained in poor-law institutions.	
	Total.	Of this from foreign[a] sick funds.			Number.	Total amount.
MUNCHEN.	*Marks.*	*Marks.*	*Marks.*	*Marks.*	*Marks.*	*Marks.*
1895	.....	.....	300	.....	8	917.52
1900	82.53	20.93	211.20	.....	53	5,852.85
1909	1,168.76	35.20	422.80	171.47	139	21,195.79
NURNBERG.						
1895	.....	.....	.....	.....	3	264
1900	92	.....	.....	47	19	2,734
1905	260	.....	875	126	51	7,130
1906	100	.....	1,065	209	71	8,596
1907	205	54	1,483	701	64	10,997
1908	520	47	1,015	1,152	94	11,918
1909	424	58	896	1,214	100	13,229
DUSSELDORF.						
1895	.....	.....	11,060	.....	.....	4,166
1900	.....	.....	28,192	.....	.....	17,898
1905	.....	.....	55,661	.....	.....	30,410
1906	.....	.....	62,347	.....	.....	32,735
1907	.....	.....	62,765	.....	.....	38,312
1908	.....	.....	54,968	.....	.....	36,742
1909	.....	.....	64,601	.....	.....	42,456
ELBERFELD.						
1895	.....	.....	.....	.....	.....	.....
1900	205	.....	646	931	.....	.....
1905	945	.....	56	1,833	.....	.....
1906	624	.....	163	1,601	.....	.....
1907	2,316	.....	1,431	12,043	.....	.....
1908	4,468	.....	1,446	11,462	.....	.....
1909	4,426	.....	1,574	13,999	.....	.....
HAMBURG.						
1895	.....	.....	32,616	.....	.....	.....
1900	.....	.....	87,932	.....	196	26,409
1905	.....	.....	163,281	.....	659	79,737
1906	.....	.....	187,936	.....	727	89,274
1907	.....	.....	184,371	.....	778	99,549
1908	.....	.....	205,255	.....	859	111,492
1909	.....	.....	222,546	.....	897	118,772

[a] To Bavaria.

It is noteworthy, in this table, that invalidity insurance brings to the poor funds steadily increasing amounts; in other words, the tendency toward a diminution of the expense of out relief is steadily increasing, which is perhaps hardly a cause of surprise if the increase in the amounts of the benefits paid is considered.

Average amount of benefits.

Year.	Invalidity benefits.	Sick benefits.	Old-age pensions.
	Marks.	*Marks.*	*Marks.*
1891	113.5	.....	124.0
1899	131.6	.....	141.6
1900	142.04	147.73	145.54
1905	159.45	160.73	159.10
1908	170.31	169.93	163.15
1909	174.80	174.15	163.58

Particularly characteristic are the constantly increasing amounts returned by the Invalidity Insurance Institution in Berlin to the poor-law board.

Year.	Total sums paid as compensations.	Paid to the poor-law board in Berlin.
	Marks.	*Marks.*
1895	13,868	13,577
1900	47,774	45,790
1905	123,159	116,229
1906	148,910	141,099
1907	173,512	163,895
1908	212,729	201,129
1909	244,658	231,897
1910	253,114	239,328
Total (1895–1910)	1,692,220	1,608,605

The Invalidity Insurance Institution in Berlin has also reported the number of cases in which insurance benefits have not prevented the recipients from becoming a charge upon the poor law, and some indication is given of the extent to which this may be attributed to insufficiency of the amount of the individual's benefit. Of 15,799 male recipients of invalidity benefits whose cards were verified 2,530, or 16 per cent of the total number, were in receipt of out relief. Of the persons receiving poor relief 2,319, or 91.7 per cent, were married and 211, or 8.3 per cent, were single.

The amount of the monthly payments of poor relief ranged between $1.50 and $7.50; in single cases more than $7.50 were given. A full quarter of persons receiving relief were in receipt of poor grants before they were entitled to an invalidity benefit; with three-quarters, the intervention of the poor-law board was necessary only after recognized invalidity. With the others there was usually no reduction of poor grants.

Of 13,032 female recipients of invalidity benefits 2,643, or 20 per cent of the total number, received poor relief. Of these recipients of relief 1,842, or 69.7 per cent, were widowed, separated, etc., the remainder single. Of the persons becoming entitled to invalidity

benefits nearly one-half were already in receipt of poor-law grants, and most of them retained their poor-law grants, generally at a higher figure.

Of 1,758 males receiving old-age pensions, 148 or 8 per cent (147 married), had a grant of poor relief, and of 445 aged females 83, or 18.7 per cent, were in receipt of poor grants.

Abandonment of the poor grants upon receipt of the pension occurred only in isolated cases.

Further particulars of the Berlin inquiry are indicated by the following summary from the official reports (No. 12, 1910) of the local Invalidity Insurance Institution of Berlin. (See also p. 47.)

Summary of discontinued grants of relief by the poor-law board of Berlin.

Cause.	Recipients of invalidity benefits.		Recipients of old-age pensions.	
	Men.	Women.	Men.	Women.
On granting of the benefit or pension	6	14		
In consequence of departure	51	50	5	6
Through transfer to a hospital	43	26	1	
Through transfer to an infirmary	89	76	9	7
Through transfer to an insane asylum	53	23		
On other grounds (unworthiness, support by relatives, recovery of capacity)	217	182	16	4
Total	459	371	31	17

A larger mass of material on this particular question is furnished by the inquiries instituted in other parts of the Empire at the instance of the Invalidity Insurance Institution of Oldenburg to indicate conditions on January 1, 1910. The results show that the poor unions were relieved of burdens to a considerable extent by the grant of benefits to industrially incapacitated persons, either because poor relief was not needed at all in many cases or because less was in each case. To be sure, many figures important for purposes of comparison are not reported. There is no indication of the total number of persons relieved or of total expenditures for poor relief in the several districts; no indication as to whether the recipients of insurance would have required assistance from the poor law if they did not receive the benefits. But the general inference for a number of districts is clearly shown.

The statistical results of these inquiries follow:[16]

Summary of recipients of insurance receiving public poor relief in the city of Berlin.

I. RECIPIENTS OF INVALIDITY INSURANCE.

Year of birth of the recipient of insurance.	Number of cards inspected.	Number of persons relieved.	Of these were (M=married; S=single; W=widowed, divorced, etc.):	Amount of monthly grant of poor relief (marks).							Beginning of relief—		Poor relief after receipt of benefits was—	
				Under 7.	7 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	30 and over.	Before— The beginning of the benefits.	After—	Reduced.	Increased.
MALES.														
Up to 1829	222	63	m. 61	2	3	11	20	15	7	3	22	41	1	21
			s. 2	....	....	1	1	....	....	....			....	1
1830 to 1834	801	218	m. 211	2	22	57	71	32	20	7	74	144	1	68
			s. 7	1	1	2	3	....	....	....			1	4
1835 to 1839	2,084	467	m. 451	6	81	144	126	64	22	8	122	345	13	90
			s. 16	....	4	7	2	3	....	....			1	1
1840 to 1844	2,930	491	m. 466	14	109	187	99	36	13	8	95	396	14	42
			s. 25	2	10	8	4	1	....	....			1	2
1845 to 1849	2,433	346	m. 323	10	80	113	81	25	12	2	73	273	13	32
			s. 23	1	11	8	3	....	....	....			2	2
1850 to 1854	1,783	253	m. 233	10	59	80	45	17	15	7	55	198	13	29
			s. 20	1	8	7	4	....	....	....			1	2
1855 to 1859	1,283	178	m. 161	3	36	65	34	17	4	2	42	136	9	10
			s. 17	....	8	8	1	....	....	....			1	1
1860 to 1864	1,251	168	m. 153	4	33	54	38	15	3	6	38	130	8	9
			s. 15	....	6	7	1	1	....	....			....	1
1865 to 1869	1,053	140	m. 117	1	24	34	35	7	7	9	28	112	3	8
			s. 23	1	11	4	5	2	....	....			....	2
1870 to 1874	816	107	m. 89	....	8	29	28	13	3	8	25	82	5	11
			s. 18	....	4	7	4	3	....	....			2	1
1875 to 1879	673	59	m. 42	....	8	11	10	9	4	....	21	38	4	4
			s. 17	1	6	8	2	....	....	....			2	1
1880 and after	470	40	m. 12	....	1	6	3	2	....	....	15	25	....	1
			s. 28	....	6	15	6	1	....	....			2	4
Total	15,799	2,530	m. 2,319	52	464	791	590	252	110	60	610	1,920	84	325
			s. 211	7	75	82	36	11	....	....			13	22
FEMALES.														
Up to 1829	162	65	w. 52	1	4	10	23	13	....	1	32	33	....	25
			s. 13	....	2	2	5	3	1	....			....	3
1830 to 1834	614	192	w. 174	....	29	65	66	13	1	....	114	78	1	99
			s. 18	....	2	10	4	2	....	....			....	12
1835 to 1839	1,746	521	w. 449	11	89	207	123	19	....	....	301	220	10	230
			s. 72	....	13	34	22	3	....	....			1	29
1840 to 1844	2,350	595	w. 491	19	159	215	92	6	....	....	299	296	22	183
			s. 104	2	35	42	19	6	....	....			....	38
1845 to 1849	2,219	425	w. 308	12	109	142	41	4	....	....	185	240	14	87
			s. 117	2	42	51	19	2	1	....			5	38
1850 to 1854	1,604	302	w. 181	6	66	75	23	9	2	....	119	183	3	50
			s. 121	8	36	53	19	5	....	....			1	36
1855 to 1859	1,072	180	w. 99	3	34	46	13	3	....	....	67	113	4	16
			s. 81	2	21	38	15	5	....	....			4	17
1860 to 1864	821	124	w. 50	2	20	16	9	2	1	....	49	75	2	13
			s. 74	1	19	41	10	3	....	....			1	13
1865 to 1869	701	106	w. 26	....	11	7	4	2	....	2	46	60	....	3
			s. 80	7	21	34	15	2	1	....			2	22
1870 to 1874	658	67	w. 8	2	2	2	2	....	....	....	27	40	1	4
			s. 59	1	21	26	9	1	1	....			5	7
1875 to 1879	588	40	w. 4	....	1	2	1	....	....	....	12	28	....	1
			s. 36	....	14	15	7	....	....	....			....	7
1880 and after	497	26	w.	....	....	....	....	....	....	....	10	16	....	....
			s. 26	....	10	12	3	1	....	....			2	1
Total	13,032	2,643	w 1,842	56	524	787	397	71	4	3	1,261	1,382	57	711
			s. 801	23	236	358	147	33	4	....			21	223

II. RECIPIENTS OF OLD-AGE PENSIONS.

Males	1,758	148	m. 147	4	17	40	45	23	13	5	35	113	4	25
			s. 1	....	....	1	....	....	....	....			....	....
Females	445	83	w. 73	3	9	23	20	13	4	1	38	45	1	25
			s. 10	....	1	4	4	1	....	....			....	1

Summary of recipients of insurance receiving public poor relief in the city of Berlin—Con.

District.	Total number of persons receiving—			Number of persons in receipt of poor relief among—			Recipients of insurance benefits receiving poor relief.		
	Benefits under the imperial act.	Invalidity or sick benefits.	Old-age pensions.	Total number receiving benefits.	Persons in receipt of invalidity or sick benefits.	Persons receiving old-age pensions.	Total number of recipients of benefits.	Persons receiving invalidity or sick benefits.	Persons receiving old-age pensions.
Sachsen-Meiningen	1,042	.....	.....	.....	37	.....	35,500	.....	.....
Oldenburg	3,534	3,016	518	156	142	14	44,400	47,100	27,000
Sachsen-Weimar	1,770	.....	.....	91	.....	.....	51,400	.....	.....
Sachsen-Altenburg	1,373	.....	.....	85	.....	.....	61,900	.....	.....
Oberpfalz	7,261	6,632	629	451	407	44	62,100	61,400	70,000
Hessen	4,227	3,911	316	272	265	7	64,300	67,800	22,200
Niederbayern	13,090	12,072	1,018	846	775	71	64,600	64,200	69,700
Reuss ä. L.	543	.....	.....	36	.....	.....	66,300	.....	.....
Kreis Gotha	1,289	.....	.....	86	.....	.....	66,700	.....	.....
Reuss j. L.	2,012	.....	.....	154	.....	.....	76,500	.....	.....
Kreis Koburg	796	.....	.....	64	.....	.....	80,400	.....	.....
Versicherungsanstalt Westfalen	34,560	30,657	3,903	2,931	2,826	105	84,800	92,200	26,900
Versicherungsanst. Sachsen-Anhalt	19,325	17,449	1,876	1,788	1,687	101	92,500	96,700	53,800
Mittelfranken	11,748	10,914	834	1,211	1,153	58	103,100	105,100	69,500
Baden	1,704	1,563	141	210	206	4	123,300	131,800	28,400

For the provincial poor union of Posen, according to the communications of the director (Landeshauptmanns), Dr. v. Dziembowski, the compensations received from invalidity insurance institutions, trade associations, and sick funds are not high in proportion to the total expenditure, but they have increased notably since 1900.

Compensations received.	1900	1905	1907	1909
	Marks.	*Marks.*	*Marks.*	*Marks.*
From invalidity benefit funds	547	234	240	659
From accident benefit funds	225	512	472	585
From sick-fund payments	7,348	12,556	15,834	17,959
Total	8,120	13,302	16,546	19,203

There is a reduction of burdens with reference to institutional relief, as given in hospitals, homes for aged persons, insane asylums, etc., for these institutions are frequented and financed in common with the insurance authorities. Thus, in the year 1909, the insurance authorities paid out 645,681 marks for institution treatment of invalids. Of this expenditure, 144,634 marks were spent in their own 13 institutions, 45,370 marks upon the 4 institutions hired by them, and 455,668, or about two-thirds of the total, was spent on 310 foreign institutions. Among these last mentioned are included principally institutions maintained by the poor-law authorities, the hospitals, institutions for alcoholism, insane asylums, etc., are included here also.

The following data are also of interest, as they show how many persons were cared for in municipal hospitals in behalf of the poor-law authorities or the sick funds. The sums expended would indeed be more significant than the figures for the number of persons, in respect to both categories with reference to the expenditure for sickness formerly borne by the communes and now by the insurance authorities.

Number of persons cared for in municipal hospitals.

Year.	Total.	On behalf of—	
		The poor authorities.	The sick funds.
BERLIN.			
1880	9,801	.....	.....
1885	11,890	.....	.....
1890	18,204	.....	4,762
1895	26,252	.....	10,692
1900	31,731	16,391	12,884
1905	38,429	17,038	16,321
1906	43,960	19,131	18,793
1907	51,840	23,548	20,632
1908	54,212	27,374	21,200
1909	55,651	31,390	19,444
HAMBURG.			
1880	10,886	3,495	.....
1885	15,574	[a] (238)4,935	7,400
1890	22,222	[a] (334)5,983	11,613
1895	20,713	[a] (783)10,642	8,526
1900	30,700	[a] (623)10,491	12,746
1905	36,735	[a] (544)10,781	13,182
1906	38,716	[a] (513)10,658	13,922
1907	39,225	[a] (546)11,022	14,841
1908	41,494	[a] (515)12,275	15,519
1909	.....	13,645	.....
MÜNCHEN.			
1880	12,883	1,454	.....
1885	12,698	2,271	.....
1890	14,531	1,973	.....
1895	18,736	2,706	11,766
1900	23,626	3,031	12,835
1905	20,797	3,386	11,492
1906	20,610	3,300	10,807
1907	22,383	3,403	11,386
1908	25,130	3,638	15,653
1909	28,197	4,092	14,374
LEIPZIG.			
1880	6,441	1,759	477
1885	5,601	1,824	1,464
1890	7,332	1,482	3,868
1895	8,840	2,688	4,254
1900	10,266	1,889	6,031
1905	12,075	2,260	7,362
1906	12,714	2,080	8,155
1907	13,591	2,426	9,592
1908	14,673	2,923	10,084
1909	15,400	3,146	10,531
BRESLAU.			
1880	8,262	4,212	597
1885	8,739	3,583	2,286
1890	9,720	3,416	2,945
1895	8,989	4,758	1,601
1900	9,529	4,743	2,565
1905	11,260	4,980	3,873
1906	12,917	5,379	4,841
1907	14,036	5,832	5,283
1908	13,210	5,427	5,143
1909	.....	.....	.....

[a] Figures in parenthesis: Partly on behalf of poor-law authority, partly on behalf of the sick fund.

Number of persons cared for in municipal hospitals—Continued.

Year.	Total.	On behalf of—	
		The poor authorities.	The sick funds.
FRANKFORT ON THE MAIN.			
1880	.....	.....	.....
1885	1,125	938	.....
1890	1,919	1,376	.....
1895	4,366	2,756	755
1900	6,066	3,000	2,300
1905	10,435	4,181	5,204
1906	10,170	3,788	5,410
1907	10,592	4,060	5,675
1908	13,542	5,245	6,203
1909	15,899	.....	.....

The anticipatory influence of workingmen's insurance is most clearly in evidence in those circumstances in which poor relief must needs be confined to provision for the most essential needs. This is particularly striking in the small poverty-stricken communes in the rural districts. There the insurance benefits for invalidity and old age are usually highly valued, principally because these benefits come in when permanent occupational incapacity has begun to make inroads upon savings so that the disabled and aged persons would become a charge upon the poor funds. In an inquiry conducted by the Bavarian statistical office, designed to serve as the basis for the reform of the Bavarian laws on citizenship and poor relief, many bürgermeisters and poor-law officials have spoken of the conditions of poor relief in their communes. Unsolicited reports from 61 of the less prosperous districts of lower Bavaria, the upper Palatinate, upper and lower Franconia spoke of the extent to which the existence of sick insurance, invalidity, and old-age insurance had reduced the expenditure of poor relief for cases of temporary illness and cases of senile or general disability. They declared that their burden for poor relief would be further diminished if this and that pauper had been connected with the insurance authorities. They also make indignant references to cases in which they must assume burdens, because the needy person had trifled away, by indifference to the insurance requirements, the benefits receivable in time of complete or partial incapacity. They give expression to their anger at one happy-go-lucky beneficiary who had not even had a single invalidity stamp on his card and who was enrolled in no sick fund. In addition to this emphasis upon sick insurance and invalidity and old-age insurance, there are also allusions from which the influence of accident insurance in reducing the burden of poor relief may be inferred. Some communes reported a positive reduction of expenditure for relief. The following statement was received

from the authorities of a commune numbering scarcely 200 inhabitants and formerly heavily burdened by charges for poor relief:

> At present, and for the last two years, the commune has been put to scarcely any expense for poor relief. The beneficial effects of the insurance laws can be readily perceived by the comparison of our present and past condition.

Similarly, another poor commune reported that "the benefits for invalidity and accident had guaranteed the poor funds against any considerable expenditure."

The importance of these utterances must not be underestimated. These are not rich communes with a prosperous industrial life, but poor communes struggling with unfavorable climates and geographical location, suffering often irreparable loss by the movement of the young men to the cities. These communes are far from the seats of culture, without knowledge of that well-being of the strenuous industrial centers which acts to some extent as a leveling force among the different classes. They do their duty grimly, harsh in their judgments on themselves, and equally severe toward their neighbors. They look with envious eyes upon the good treatment received by villagers who have become destitute in the great cities. In these communities the characteristic expression of opinion is, "The poor out there are better off than we are here at home."

The fact of a reduction of the burden of poor relief by workingmen's insurance is also admitted by those persons intimate both with the practical administration of poor relief in the great cities and with the practice of workingmen's insurance. Of many I need name only Münsterberg of Berlin, Ohlshausen of Hamburg, Grieser of Munich, Flesch of Frankfort, Soetbeer of Kiel, Freund of Berlin, Bieleteld of Lubeck, and Schmid of Augsburg. And if further proof is necessary, we need only mention the Association for Poor Relief and Public Welfare in Germany. It has repeatedly indicated its strong sympathy with workingmen's insurance, it has brought up for discussion at its congresses the questions, how insurance can best be more thoroughly applied, how poor relief can best cooperate so that all who are required or entitled to insure may make the best use of these facilities. This program would include an extension of voluntary insurance, increase of the amount of insurance, renunciation of compensation for contributions, voluntary insurance of craftsmen.

III. CAUSES OF THE INCREASE IN EXPENDITURE FOR POOR RELIEF.

The reduction of burdens of poor relief actually produced by workingmen's insurance is not necessarily a saving in public expenditure. Usually it is not evident in a reduction of the poor budgets

of States, communes, or other public authorities. It does not benefit the employers and well to do by reducing the taxes for poor relief; it would thus be an error to undervalue the sums contributed by the employee and employers for the purpose of insurance. Even in those places in which the burdens of relief have been notably reduced, the amount of the reduction is by no means equal to the expenditure for purposes of insurance. In Konigsberg, according to the observations of C. Brinkmann,[17] expenditure for poor relief had scarcely increased at all in 1898, despite an increase of about 20,000 in population since the application of the State insurance laws for sickness and accidents till 1898. In recent years the expenditure has fallen, but even if the expenditures for poor relief had increased at their former rate, the saving in taxes to the entire civil population would have amounted to only 130,000 marks annually, whereas the contributions of employers alone to workingmen's insurance amounted to about 380,000 marks (1896–97).

In reality the expenditures for poor relief have increased nearly everywhere both in respect to the numbers relieved and in the amount of individual grants.

The following data for the Kingdom of Bavaria (as one of the few German States possessing comprehensive statistics of pauperism) for a few large cities and some municipal and district poor unions will show these tendencies more exactly.

1. *Expenditure for poor relief and public charity in Bavaria by communes, districts, provinces, and the State, 1901 and 1907.*

[Figures in parentheses refer to temporary stations, which have been omitted in the general total.]

[Amounts given in thousands of marks.]

Statement.	1901		1907	
	Items.	Totals.	Items.	Totals.
I. COMMUNES.				
1. Poor relief	.....	11,391	.....	14,453
2. Communal institutions, poorhouses, hospitals:				
(a) Almshouses	1,565	.....	1,928	.....
(b) Orphan homes and homes for neglected children	272	.....	287	.....
(c) Institutions for small children	282	.....	276	.....
(d) Workhouses and soup kitchens	145	.....	172	.....
(e) Hospitals (excluding Munich)	2,440	4,704	3,210	5,873
Total	.....	16,095	.....	20,326
II. DISTRICTS.				
1. Expenditure of district poor funds:				
(a) Aid to overburdened communes	.....	.....	.....	.....
(b) Maintenance of district institutions	620	.....	770	.....
(c) Increase of district funds	51	.....	39	.....
(d) Voluntary contributions	343	1,014	334	1,143
2. District institutions:				
(a) Hospitals	1,681	.....	2,169	.....
(b) Charitable institutions and almshouses	177	1,858	172	2,341
Total	.....	2,872	.....	3,484

1. *Expenditure for poor relief and public charity in Bavaria by communes, districts, provinces, and the State, 1901 and 1907*—Continued.

Statement.	1901		1907	
	Items.	Totals.	Items.	Totals.
III. PROVINCES.				
1. Poor relief:				
(*a*) Contributions to the districts	.....	.....	.....	.....
(*b*) Direct contributions to communes	.....	.....	.....	.....
2. Contributions to charitable institutions, almshouses, and insane asylums:				
(*a*) Insane asylums of provinces	1,664	.....	3,191	.....
(*b*) Other hospitals	352	.....	298	.....
(*c*) Homes for idiots and imbeciles	61	.....	81	.....
(*d*) Homes for deaf mutes	186	.....	301	.....
(*e*) Homes for the blind	18	.....	35	.....
(*f*) Homes for crippled children	17	.....	19	.....
(*g*) Homes for neglected children	143	.....	151	.....
(*h*) Medical attendance for the poor	56	.....	55	.....
(*i*) Voluntary aid to communes and private institutions	56	.....	51	.....
(*j*) Other expenditures	59	2,612	77	4,259
3. Expenditures according to the by-accounts of above-mentioned institutions	.....	5,946	.....	8,583
Total	.....	7,658	.....	12,842
IV. STATE.				
1. Contributions to almshouses and hospitals	.....	.....	.....	.....
2. Payments on ground of the acts on settlement, public relief of poor and sick	353	.....	437	.....
3. Payments for education in reformatories	.....	.....	110	.....
4. Compensation to the fund of the Palatinate province for loss of the third of police fines	.....	.....	.....	.....
5. Expenditures for cultivation	1	.....	.....	.....
6. State contributions to public and private reformatories for neglected adolescents	16	.....	12	.....
Total	.....	370	.....	559
Total expenditures, I to IV	.....	26,995	.....	37,211
Deduct from expenditures of institutions: [a]				
For I	.....	4,704	.....	5,873
For II	.....	1,858	.....	2,341
For III	.....	5,046	.....	8,583
Total	.....	11,608	.....	16,797
Net expenditure	.....	15,387	.....	20,414

[a] As their expenditures are covered in part by their own income and in part by the contributions mentioned.

2. *Number of persons supported by communal relief funds and amount of expenditure for poor relief in Bavaria: 1900–1909.*

IN GENERAL.

Year.	Total number relieved (excluding other members of the family).	Permanently relieved.						Temporarily relieved.	Proportion relieved per 1,000 inhabitants.		Expenditure for relief.	For persons permanently relieved.						For temporary relief.	Expenditures per head of population.	Proportion of poor relief per 100 marks of State income from taxation.
		Total.	Of these—			Adults.	Young persons.		Total.	Permanently.		Total.	Of this there was expended—			For adults.	For young persons.			
			With money.	In kind.	In institutions.						In 1,000 marks.		In money.	For supplies.	For relief in institutions.				Marks.	
1900	189,484	110,072	74,318	31,890	17,446	62,980	47,092	79,412	31	18	9,124	7,324	3,723	820	2,781	6,060	1,264	1,800	1.5	.....
1901	200,265	112,402	73,435	35,000	17,303	65,103	47,299	87,863	32	18	9,421	7,514	3,820	853	2,841	6,139	1,375	1,907	1.5	24.6
1902	202,555	114,643	74,271	37,034	18,268	65,997	48,646	87,912	32	18	9,892	7,917	3,993	882	3,042	6,484	1,433	1,975	1.6	25.1
1903	205,649	113,699	70,787	39,586	18,703	66,865	46,834	91,950	32	18	10,399	8,279	4,107	910	3,262	6,775	1,504	2,120	1.6	26.1
1904	201,695	112,617	67,223	41,869	19,752	67,682	44,935	89,078	31	17	10,670	8,575	4,196	900	3,479	7,044	1,531	2,095	1.7	26.5
1905	200,334	111,248	64,418	43,449	21,032	67,220	44,028	89,086	31	17	10,971	8,812	4,258	924	3,630	7,222	1,590	2,159	1.7	27.4
1906	199,029	111,436	63,563	43,288	21,964	67,261	44,175	87,593	30	17	11,596	9,359	4,383	962	4,014	7,694	1,665	2,237	1.8	27.9
1907	198,277	110,747	63,162	43,806	21,827	67,251	43,496	87,530	30	17	11,933	9,649	4,458	984	4,207	7,910	1,739	2,284	1.8	27.4
1908	215,438	115,329	62,674	47,056	23,223	69,608	45,721	100,109	33	17	12,831	10,230	4,661	1,035	4,534	8,391	1,839	2,600	2.0	27.4
1909	235,269	123,663	63,885	53,305	24,291	74,456	49,207	111,606	36	18	13,810	10,934	4,843	1,127	4,964	8,941	1,993	2,875	2.1	28.9

(b) EXPENDITURES BY CLASSES OF TOWNS.

Classification of towns by size.	Number of persons relieved.				Number relieved per 1,000 inhabitants.				Expenditures for relief (in 1,000 marks).				Burden of relief per capita (marks).			
	1900	1907	1908	1909	1900	1907	1908	1909	1900	1907	1908	1909	1900	1907	1908	1909
Up to 500 inhabitants	29,532	22,763	23,489	24,040	21	16	17	17	1,316	1,496	1,562	1,691	0.9	1.1	1.1	1.2
501 to 1,000 inhabitants	33,295	27,324	27,906	29,037	23	19	19	20	1,617	1,867	1,990	2,076	1.1	1.3	1.4	1.4
1,001 to 2,000 inhabitants	24,271	21,456	23,189	25,925	27	23	25	28	1,190	1,392	1,513	1,636	1.3	1.5	1.6	1.8
2,001 to 5,000 inhabitants	19,201	20,552	22,945	23,892	32	31	35	36	909	1,181	1,280	1,358	1.5	1.8	1.9	2.0
5,001 to 10,000 inhabitants	7,753	10,961	12,950	14,220	35	39	47	51	342	572	622	639	1.5	2.1	2.2	2.3
10,001 to 20,000 inhabitants	8,502	8,817	9,679	10,687	38	37	40	44	412	487	504	569	1.8	2.0	2.1	2.4
Over 20,000 inhabitants	66,930	86,404	95,280	107,468	48	55	60	68	3,338	4,938	5,360	5,841	2.4	3.1	3.4	3.7
Kingdom	189,484	198,277	215,438	235,269	31	30	33	36	9,124	11,933	12,831	13,810	1.5	1.8	2.0	2.1

2. *Number of persons supported by communal relief funds and amount of expenditure for poor relief in Bavaria: 1900–1909*—Continued.

3. LARGE CITIES.[a]

Year.	Expenditure for relief.			Number of persons permanently relieved.	Civil population according to the census (from 1906 average population).
	Total.	Of this—			
		For permanently relieved.	For pauper burial.		
BERLIN.[b]	*Marks.*	*Marks.*	*Marks.*		
1880	3,755,208	.....	.....	19,222	1,102,037
1885	3,901,176	2,834,905	12,395	23,353	1,294,732
1890	5,164,763	3,521,436	11,951	26,838	1,558,910
1895	7,496,997	4,920,610	15,379	34,396	1,654,266
1900	9,154,014	6,257,952	18,441	39,776	1,865,706
1905	10,930,430	7,755,160	17,103	45,285	2,017,760
1906	11,151,632	7,888,564	18,034	44,882	2,042,289
1907	11,540,521	7,980,652	18,631	44,771	2,073,930
1908	12,314,385	8,353,956	21,289	46,393	2,080,339
1909	13,172,344	8,562,744	20,126	48,783	2,084,125
HAMBURG.					
1885	.....	.....	.....	6,425	470,435
1890	.....	.....	.....	7,678	568,141
1895	5,745,699	1,998,995	31,883	9,352	624,002
1900	5,655,452	1,905,072	33,455	8,851	703,930
1905	5,478,630	1,919,846	36,606	9,213	800,931
1906	5,451,769	1,889,746	36,092	9,023	814,928
1907	5,490,664	1,852,041	35,846	8,762	842,717
1908	6,142,622	1,950,000	46,650	8,898	864,375
1909	6,277,597	1,950,000	46,200	9,229	885,904
MUNCHEN.					
1880	649,899	433,521	2,677	7,570	223,862
1885	762,725	588,742	2,600	7,831	255,094
1890	945,504	656,942	2,716	8,712	339,758
1895	1,331,632	870,114	5,372	11,133	395,956
1900	1,647,438	1,119,540	6,950	14,179	488,052
1905	2,667,113	1,570,331	10,543	22,571	527,849
1906	2,386,387	1,667,001	9,417	22,900	531,000
1907	2,580,045	1,774,351	9,170	23,161	541,000
1908	2,776,848	1,887,515	10,961	24,503	550,000
1909	3,034,242	2,040,586	11,492	25,187	560,000
LEIPZIG.					
1885	763,586	724,767	3,480	.....	166,967
1890	1,006,654	953,559	7,908	.....	291,421
1895	1,558,636	1,464,674	9,388	.....	395,385
1900	1,836,446	1,719,942	9,348	.....	452,549
1905	2,636,974	2,347,039	13,462	7,044	502,010
1906	2,720,505	2,426,546	13,505	7,468	507,781
1907	3,068,609	2,710,373	13,984	7,491	517,673
1908	3,344,148	2,950,748	14,203	7,893	527,565
1909	4,411,289	3,973,475	12,256	8,309	537,457
BRESLAU.					
1895	1,248,736	.....	7,627	7,046	366,977
1900	1,780,397	.....	13,043	8,420	416,761
1905	2,322,244	.....	18,635	9,447	464,926
1906	2,446,822	.....	21,062	9,549	473,225
1907	2,627,824	.....	19,521	9,769	482,299
1908	2,821,687	.....	19,463	10,281	490,913
1909	.....	.....	.....	.....	499,377
COLN.[c]					
1890	1,733,472	403,342	.....	4,667	273,727
1895	2,020,847	439,461	.....	4,612	311,620
1900	2,503,327	461,578	.....	4,000	365,602
1905	3,280,188	485,858	.....	4,017	421,409
1906	3,470,433	455,784	.....	3,593	428,580
1907	3,755,389	433,817	.....	3,535	442,972
1908	4,404,600	452,543	.....	3,693	454,867

[a] The tables are based upon personal investigations of the writer.
[b] For another table on the increase of poor relief in Berlin see No. 4.
[c] There are no costs for pauper burial in Cologne. Burials of paupers are performed gratuitously in the territory of the city within the area of the combined undertakers by reason of duties assumed by contract. Other costs are borne by particular religious associations.

2. *Number of persons supported by communal relief funds and amount of expenditure for poor relief in Bavaria: 1900–1909*—Continued.

3. LARGE CITIES—Continued.

Year.	Expenditure for relief.			Number of persons permanently relieved.	Civil population according to the census (from 1906 average population).
	Total.	Of this—			
		For permanently relieved.	For pauper burial.		
FRANKFORT ON THE MAIN.	*Marks.*	*Marks.*	*Marks.*		
1885	764,807	.....	7,842	.....	154,441
1890	798,176	.....	7,400	1,472	180,020
1895	1,067,195	.....	8,366	1,727	226,447
1900	1,377,174	.....	8,887	1,983	286,416
1905	2,154,784	.....	10,383	2,621	332,350
1906	2,201,771	.....	11,115	.....	340,000
1907	2,315,784	.....	10,778	2,707	352,000
1908	2,900,642	.....	13,873	.....	360,000
1909	3,070,271	.....	10,369	.....	369,000
NURNBERG.					
1880	402,680	257,619	a 3,560	2,071	97,420
1885	413,217	266,653	a 3,755	3,538	112,465
1890	440,910	286,892	a 4,197	3,612	139,714
1895	514,151	421,963	a 5,038	6,575	159,603
1900	704,616	560,836	a 5,789 b 9,631	9,030	257,706
1905	946,395	750,362	a 6,562 b 7,616	10,421	290,945
1906	1,014,070	815,666	a 5,695 b 7,054	11,260	294,700
1907	1,066,137	858,546	a 5,829 b 6,237	11,539	304,200
1908	1,176,799	955,546	a 6,612 b 6,438	14,496	310,400
1909	1,320,000	.....	a 6,292 b 5,223	.....	316,400
DUSSELDORF.					
1880	311,326	96,882	8,635	2,644	95,458
1885	359,428	149,047	6,024	3,374	115,190
1890	488,773	222,860	5,298	4,873	144,642
1895	741,316	294,865	5,177	6,897	175,985
1900	847,803	391,115	6,501	6,966	213,711
1905	1,108,864	489,042	9,344	9,682	253,274
1906	1,154,580	502,578	9,395	9,798	257,350
1907	1,342,926	507,093	8,821	10,337	265,000
1908	1,438,769	569,034	11,274	10,537	278,000
1909	1,611,642	664,157	12,728	11,700	290,000
ELBERFELD.					
1880	545,811	93,503	779	1,124	93,538
1885	536,274	99,794	512	1,247	109,218
1890	665,915	170,129	528	1,270	125,899
1895	576,897	224,791	984	1,583	139,337
1900	674,040	237,453	955	1,346	156,963
1905	788,881	265,223	961	1,508	162,853
1906	777,930	231,915	889	1,323	164,165
1907	802,474	213,848	790	1,256	166,537
1908	883,857	253,631	1,032	1,214	168,037
1909	.....	.....	.....	.....	169,126

a Natives. b Strangers.

2. *Number of persons supported by communal relief funds and amount of expenditure for poor relief in Bavaria: 1900–1909*—Continued.

4. BERLIN.[a]

Year.	Average number of inhabitants.	Average number of— Persons in receipt of alms.	Foster children.	Other persons in receipt of relief.	Total.	Per 100 inhabitants.	Expenditure for public relief. Total.	Per capita.
1884	1,233,823	15,522	7,006	1,959	24,487	1.98	2,866,760	2.32
1885	1,284,334	15,998	7,355	2,012	25,365	1.97	2,996,038	2.33
1886	1,327,162	16,550	7,522	1,893	25,965	1.96	3,102,651	2.34
1887	1,399,755	17,060	7,692	1,859	26,611	1.90	3,225,777	2.30
1888	1,453,693	17,619	6,982	2,013	26,614	1.83	3,376,531	2.32
1889	1,512,997	18,400	7,840	2,009	28,258	1.87	3,535,972	2.34
1890	1,564,616	19,087	7,751	2,279	29,117	1.86	3,736,692	2.39
1891	1,578,672	20,169	7,976	3,213	31,358	1.99	4,490,509	2.84
1892	1,595,393	21,737	8,399	4,180	34,316	2.15	4,605,287	2.89
1893	1,609,001	23,062	8,654	4,195	35,911	2.23	4,919,503	3.06
1894	1,624,538	24,132	8,675	4,878	37,685	2.32	5,223,537	3.22
1895	1,644,316	25,460	8,936	4,681	39,077	2.38	5,496,853	3.34
1896	1,684,565	26,466	8,997	4,235	39,698	2.36	5,656,472	3.36
1897	1,720,793	27,685	9,268	4,486	41,439	2.41	5,988,899	3.48
1898	1,765,533	28,460	9,509	4,576	42,545	2.41	6,317,771	3.58
1899	1,804,913	29,505	9,669	4,581	43,755	2.42	6,661,212	3.69
1900	1,851,221	29,869	9,907	4,788	44,564	2.41	6,936,649	3.75
1901	1,871,771	30,845	9,959	6,234	47,038	2.51	7,464,698	3.99
1902	1,886,705	32,428	10,559	6,933	49,920	2.65	8,076,166	4.28
1903	1,917,609	33,945	11,060	6,138	51,143	2.67	8,384,580	4.37
1904	1,972,045	33,844	11,058	5,535	50,437	2.56	8,401,563	4.26
1905	2,010,826	33,944	11,341	5,204	50,489	2.51	8,503,186	4.23
1906	2,064,677	33,528	11,354	4,924	49,806	2.41	8,616,126	4.17
1907	2,096,318	33,371	11,400	5,530	50,301	2.40	8,826,646	4.21
1908	2,102,727	34,336	12,057	7,706	54,099	2.57	9,518,090	4.53
1909	2,106,513	34,595	12,926	8,080	55,601	2.64	10,007,203	4.75

[a] According to the summaries on poor relief in 1909 in the municipal Verwaltungsbericht.

5. COST OF RURAL POOR RELIEF IN WESTPHALIA, 1886–1909.

Fiscal year.	Cost of rural poor in the communes.	Cost of rural poor in institutions.	Grants to overburdened communes.	Total costs.	Compensations received.[a]
	Marks.	*Marks.*	*Marks.*	*Marks.*	*Marks.*
1886	225,000	71,000	4,000	300,000	5,000
1890	239,000	88,000	3,400	330,400	8,000
1895	355,000	135,000	1,600	491,600	9,000
1900	358,000	255,000	2,700	615,700	20,000
1905	485,000	350,000	800	835,800	36,000
1906	460,000	356,000	1,300	817,300	39,000
1907	513,000	381,000	1,100	895,100	53,000
1908	538,000	445,000	1,000	984,000	60,000
1909	575,000	459,000	650	1,034,650	65,000

[a] These consist primarily in benefits received under sec. 49 of the imperial insurance act and the claims on the sick funds according to sec. 57 of the imperial insurance act.

6. COST OF RURAL POOR RELIEF IN RHENISH PRUSSIA, 1886–1909.

Year.	Marks.	Year.	Marks.	Year.	Marks.
1886	611,000	1902	1,490,000	1907	1,583,000
1890	700,000	1903	1,502,000	1908	1,715,000
1895	1,006,000	1904	1,490,000	1909	[a] 1,697,000
1900	1,349,000	1905	1,510,000		
1901	1,407,000	1906	1,504,000		

[a] On the basis of statistics for the past decade, Landeshauptmann Dr. Renvers claims that in prosperous years with rising markets the total costs remain approximately the same; the expenditures for out relief included in this sum have actually decreased, while the expenses of the Rhenish Union for maintenance of mentally afflicted persons in institutions have increased steadily. In the years of economic depression (1907–1909) costs of poor relief show a considerable increase.

This increase in expenditure for poor relief does not indicate an increase in the extent of poverty but rather in the comprehensiveness of charitable effort with reference to available means; it is only partially related to workingmen's insurance. The decisive influences have been tendencies that are quite distinct.

1. In the first place we must emphasize the rapid increase of population, and particularly the movement toward the cities.

The total population of Germany increased in 25 years (1882–1907) from 45,200,000 to 61,700,000—in all, 16,500,000, or 36.5 per cent. The annual excess of births in Germany amounts, on the average, to 800,000 or 900,000 (in 1909, 884,061, or 13.8 per thousand of the population).

It is common knowledge that the less prosperous classes have contributed most largely to this increase. Thus, of the 16,500,000 increase between 1882 and 1907, 12,500,000 falls within the occupational class—agriculture, industry, trade, and communication. Of these 12,500,000 the workingmen alone constitute 10,000,000.

The movement toward the cities and centers of industry, favored by the laws of settlement and of freedom of movement, is also to be considered. The extent of this urban movement is indicated by the rapid increase in the number of large cities and the proportion of urban population derived from outside, for scarcely one-half the inhabitants of the large cities were born there. There were, for example in 1882, 15 large cities in the Empire with a population of 3,400,000 inhabitants, or 7.6 per cent of the total population; in 1907 there were 42 large cities with 11,790,000 inhabitants, or 19.1 per cent, not including the suburbs, which have been carried in the direction of metropolitan conditions by the rapid growth of the central urban district. Among those coming to the cities there are of course many who, for various reasons, need relief either for themselves or for their relatives before they have acquired settlement. Many such can be maintained in the city by private charity until they have acquired settlement and the city authorities laid under legal compulsion to support them.[18] As a rule, they are persons who find no regular occupation in the rural districts and in the small towns. They lead a very uncertain life there and consequently go to the cities in expectation of better opportunities for work and at least more generous relief in case they become destitute. They discover that the life of the city not only offers greater opportunities for employment, but also involves a higher standard of living, higher prices, as well as many dangers to the workingman's household, and that with the increase in the population and wealth of a city there is also greater danger of destitution. The result is that the persons coming to the cities furnish a larger contingent than the natives to the numbers relieved.[19]

Besides, the higher figures for relief in the cities are in part a consequence of a better and more generous provision for the poor, which is out of the question for districts with less abundant opportunities for work. Where the means are so limited that every additional case for relief means increased assessments, grants of money are avoided as far as possible, and relief is granted in the dreaded almshouse or in the form of supplies contributed in rotation by the various townspeople. In the cities, on the contrary, according to Von Hollander,[20] the usual practice is to make grants of money, which makes it possible for the poor to preserve some degree of independence and spare their sense of honor. Consequently it is not unjust to represent the expenditures for relief (see the Bavarian tables according to the size of cities) as an indication of prosperity and the more elaborate organization of relief.[21,22] This proposition is confirmed by its converse—that in cities with smaller increases in population, i. e., in consequence of a lower rate of immigration, as, for example, in Magdeburg, the number of cases of relief declines (1887, 2.60 persons relieved per 100 inhabitants; 1907, 1.86). The decrease is evident, too, in absolute figures; in the unfavorable year 1908 the number of persons wholly or partially relieved (4,788) was only a trifle greater than the number relieved 20 years earlier (4,766).[23]

2. Besides these changes in the composition of the population which have led to an increase in expenditure for poor relief, we must remember that many types of needy persons are reached by the insurance laws that were not affected by previous charitable legislation. Notable in this respect are the categories widows and orphans and children in general. This was particularly true of the persons entitled to poor relief in rural districts; there was little coincidence between the application of insurance and poor relief, as Landeshauptmann Dr. Dziembowski has shown statistically for the Poor Union of the Province of Posen. We must remember also that for the aged and invalids the benefits are frequently insufficient, so that the support of aged and defectives has remained in large measure a charge upon poor relief. The imperial insurance act will thus render great assistance to poor relief.

3. The group from which are recruited the pensioners of the poor law has been enlarged in various ways by legislation. Thus, from April 1, 1894, the supplementary statute of March 12 on settlement, which then came into force (Reichs-Gesetz-Blatt, S. 259), and from April 1, 1909, the new statute on settlement of May 30, 1908 (Reichs-Gesetz-Blatt, S. 381), made it easier to acquire settlement,[24] increased the number of persons entitled to relief, at least in the larger cities to which such people migrate, and resulted in increased expenditure in the provincial unions. We must include in this category the Prussian law of July 11, 1891, on the so-called exceptional burdens of poor relief. According to this statute, to which the supplementary

Bavarian statutes of February 3, 1888, and May, 1902, are analogous, the care of idiots, imbeciles, epileptics, mentally deranged persons, etc., is given to provincial poor unions, whereas formerly such persons were a charge upon the municipal unions unless rural paupers were concerned. The provincial union also has to bear the general expenses of maintaining the institutions and the costs of pauper burials from the institutions. The increased expenditures imposed upon the provincial unions by these laws have continued to rise. Thus, the Westphalian union,[25] which spent, in 1893, 196,665 marks upon 2,131 sick members who were relieved in institutions, spent, in 1907, 559,181 marks for 5,499 sick persons.

Fiscal year.	Number of sick in receipt of relief at the end of the fiscal year.	Amount of expenditure.		Amount of income.		Proportion of charge borne by the district poor union.	
		Marks.	Pfennigs.	Marks.	Pfennigs.	Marks.	Pfennigs.
1893	2,131	800,251	07	603,585	65	196,665	42
1894	2,462	911,887	54	686,998	.....	224,889	54
1895	2,651	1,006,979	39	757,952	35	249,027	04
1896	2,894	1,104,140	89	843,485	48	260,664	41
1897	3,132	1,213,006	66	920,296	07	292,710	59
1898	3,314	1,322,963	42	987,711	64	335,251	78
1899	3,502	1,407,777	56	1,040,904	79	366,872	77
1900	3,752	1,499,331	02	1,142,599	99	356,731	03
1901	4,029	1,599,024	78	1,171,363	64	427,661	14
1902	4,282	1,709,598	62	1,254,414	33	455,184	29
1903	4,575	1,843,328	01	1,347,686	76	495,641	25
1904	4,786	1,954,467	12	1,436,686	26	517,780	86
1905	5,022	2,047,615	66	1,518,210	11	529,405	55
1906	5,283	2,189,435	25	1,657,304	19	532,131	06
1907	5,499	2,293,776	32	1,734,594	93	559,181	39

The same may be said of the act of July 2, 1900, for the reformatory education of minors, which supplanted the former statute on education in reformatories. This new statute has extended considerably the application of reformatory training, inasmuch as it is permissible to send a child to such a training school even if no criminal act has been committed, and until the completion of the eighteenth year. The poor unions are no longer under any obligation to bring up at their own cost children in need of systematic training, but the law imposes upon them certain expenses (for example, cost of transportation and of the first outfitting, cost of burial of such as die during the period of training, return transportation of a child dismissed from the institution). Consequently, a larger number of poor children are sent to these training schools, so that the reduction of the financial burdens of poor relief in the particular case is offset in no small measure by the increase in the number of cases. But the relieving authorities act with a full understanding of their interests; the discontinuation of this reformatory treatment would subject them to still greater burdens for the maintenance and education of minors, and they have reason to expect that this training will make

at least some of the children capable and efficient men who will be independent of poor relief.[26]

4. The increase of expenditure for relief has also been influenced by better knowledge of the poor laws; there is a better understanding of the legal regulations both by private persons and the local authorities.

5. Furthermore, the more careful supervision by the local authorities of the movements of persons without property has led to increased promptness and frequency in the claims made against the provincial unions.

Year.	Total cost of training.	Expenditure by—	
		The State.	The communal union.
	Marks.	*Marks.*	*Marks.*
1900	1,677,977	837,843	840,134
1905	6,776,116	4,500,059	2,276,057
1908	9,021,932	5,970,333	3,051,599
1909	10,102,770	6,685,949	3,416,821

6. Another important factor in the increase of expenditure on poor relief is the character of modern economic development. It has brought about a general increase in popular well-being, a significant rise in the incomes of the middle and lower classes, so that standards of living have improved considerably. All this has rendered society more exacting in its requirements, the uninsured lower classes have a higher minimum standard, and the propertied classes are more generous in the recognition of these needs.

As a measure of the increase in general well-being we may refer to the figures of the Prussian income tax from 1892 to 1909, also to the statistics of the income tax in Saxony from 1888 to 1908,[27] and the German savings-bank statistics, 1900–1908.[28]

Assessed net income of physical persons in Prussia.

[In million marks.]

	1892	1901	1904	1905	1906	1907	1908	1909
Incomes of—								
900 to 3,000 marks	2,912	4,328	4,895	5,209	5,551	6,592	7,344	7,642
3,000 to 6,000 marks	833	1,138	1,269	1,323	1,385	1,523	1,623	1,705
6,000 to 9,500 marks	412	559	610	636	664	672	705	722
Over 9,500 marks	1,547	2,351	2,349	2,501	2,732	2,961	3,123	3,151
Total	5,704	8,376	9,123	9,669	10,332	11,748	12,795	13,220
Estimated incomes of persons exempt from taxation (incomes of less than 900 marks)	3,995	3,926						

The economic advance of the working classes, which is admitted even by the German trades unions,[29] is indicated by the following statistics of wages, an increase by no means nullified by the rise in the cost of living, by the statistics on the shorter hours of labor, and by statistics of consumption of articles of general use:[30]

Numbers of persons per 1,000 making the undermentioned weekly contributions to invalidity insurance, as reported by 31 German insurance institutions.

Year.	I. 14 pfennige.	II. 20 pfennige.	III. 24 pfennige.	IV. 30 pfennige.	V. 36 pfennige.
1891	253	384	217	146	.....
1895	227	392	235	146	.....
1900	189	342	238	158	73
1905	133	305	250	178	134
1906	127	290	244	183	156
1907	119	274	242	183	182
1908	114	263	243	179	201
1909	105	250	254	178	213

The contributions toward invalidity insurance in 31 German insurance institutions were distributed as follows among the different wage groups:

Year.	I. 14 pfennige.	II. 20 pfennige.	III. 24 pfennige.	IV. 30 pfennige.	V. 36 pfennige.
1891	17.06	36.87	24.98	21.09	.....
1895	15.12	37.21	26.86	20.81	.....
1900	11.73	30.34	25.27	21.07	11.59
1905	7.61	25.23	24.97	22.16	20.03
1906	7.15	23.58	23.87	22.39	23.01
1907	6.56	21.80	23.30	22.07	26.27
1908	6.19	20.70	23.09	21.28	28.74
1909	5.59	19.45	23.85	20.98	30.13

Average yearly wage [a] of all miners in Prussia.[b]

	Marks.
Hard coal:	
Upper Silesia—	
1880	516
1890	671
1900	877
1910	964
Lower Silesia—	
1888	630
1890	735
1900	910
1910	974
Dortmund—	
1888	863
1890	1,067
1900	1,332
1910	1,382
Saarbrücken—	
1888	842
1890	1,114
1900	1,044
1910	1,122
Aachen—	
1890 [b]	878
1900	1,194
1910	1,375
Soft coal:	
Halle—	
1888	653
1890	730
1900	931
1910	1,089
Left bank of Rhine—1910 [c]	1,172
Salt:	
Halle—	
1888	920
1890	1,012
1900	1,142
1910	1,193
Clausthal—1910	1,226
Iron ore:	
Mansfeld—	
1888	757
1890	853
1900	1,013
1910	1,079
Upper Harz—	
1888	552
1890	613
1900	665
1910	921
Siegen-Nassau [d]—	
1890 [b]	676
1900	996
Siegen—1910	1,091
Nassau and Wetzlar—1910	931
Other right bank of Rhine Provinces—	
1890 [b]	639
1900	870
1910	977
Left bank of Rhine—	
1890 [b]	634
1900	728
1910	878

[a] Allowance made for all contributions to invalidity insurance bureaus and miners' insurance societies.
[b] Figures available only since 1889.
[c] Figures available only since 1904.
[d] Since 1906 the district Siegen-Nassau includes both districts Siegen and Nassau-Wetzlar.

Furthermore, the cost of living has risen, as we have already remarked. The prices of the necessities of life and house rents have risen. For this reason the need of relief has increased and the expenditures of both communal and provincial unions have increased both for out relief and for relief in institutions. The salaries of persons employed in the administration of the poor laws have increased.

7. Finally, the social conscience which has been aroused and deepened by social legislation has been a factor in the increased expenditures by the poor-law authorities.

It is a confirmation of the old principle: The people makes its own laws, but the laws at the same time make the people. Workingmen's insurance has been a social-political school for the community, becoming steadily more influential. Among the well-to-do classes it has created a better understanding of the obligation to assist the lower classes and lift them up to a higher level of economic and cultural life. Consequently the means set free by the application of workingmen's insurance and the new resources of increased wealth have resulted in a further development of poor relief, partly by extension of the field of work, partly by giving the work a more distinctly social character.

This new development is manifested by more ample grants of poor relief and intensive activity in attending to cases formerly neglected or deemed unavoidable. The sharp distinction between public relief and voluntary charity has been modified, and the relieving authorities have been freed from that conflict between the duty of giving only a little and the knowledge that a mere pittance will be of no real assistance.

In public relief this social conception comes to the fore particularly with reference to the amount of relief granted to individuals, which are now more generous. Workingmen's insurance also exerts a reflex influence upon the poor relief of the present day. Because of the benefits paid to insured persons by the funds, the uninsured persons are moved to try to secure more generous grants from the relieving authorities, an attempt that not infrequently succeeds. Workmen who have already enjoyed the benefits of insurance and then later severed connection with the insurance authorities are likely to demand quantitatively and qualitatively more assistance if they apply later to the poor authorities for relief in time of sickness.

Increased poor grants in time of sickness are sought naturally enough. Habit is frequently a matter of importance. Once a workman has experienced the benefit of the prompt and more generous help in time of his own sickness, in case of illness of some uninsured member of the family, he will expect similar assistance even if he must needs apply to the poor-law authorities; he will claim this on the ground that adequate assistance is to be given in time of sickness. The relieving authorities can accede to these wishes easier nowadays,

because of the improved provision of medical attendance brought about by the insurance laws and particularly important in the small villages and rural districts. Not only has regular medical service in many cases supplanted the quacks and surgeon barbers, but professional nursing has become available (secular or conventual nurses) partly because of the contributions from invalidity insurance institutions. The relieving authorities have also been able to extend these increased facilities to their wards by reason of the decrease in charges for medical attendance. Thus they have availed themselves of the discounts obtained by the insurance authorities from the druggists, so that there has been a great increase in the use of medicine among the poor.

Institutional relief has been profoundly influenced by this new tendency. The knowledge that precautionary measures taken in good season saved much expense and anticipated much destitution was here of great significance. This knowledge led to a systematic campaign against those forms of disease which predominate among the causes of poverty. In many such cases the origin, progress, and protraction of illness can be traced to a poverty that can spend nothing on the care of health.[31]

The interests of the relieving authorities and of the poor in this respect run more nearly parallel. The need of more frequent and better medical attendance is impressed upon the poor by attention received by the insured with most of whom they are connected by kinship or social ties. The relieving authorities realize that if they give aid at the right moment for a limited time they save themselves expenditure for an indefinite period, and they are thus inclined to effect not merely temporary alleviation but permanent cure. To this end there is more disposition than formerly to grant hospital treatment and assistance during convalescence. Cases which the insurance authorities refuse to treat because of uncertainty of cure, the relieving authorities make medical provision for, in hopes of making it possible for the person to enter the institution of an insurance society if the course of the illness is favorable. They also contribute to the treatment given by the invalidity insurance institution, frequently at their instance, providing the clothing needed for a cure lasting several months, transportation for the patient and assistance for the family. This is done if possible with the resources derived from charitable bequests or special funds so that there are none of the political consequences connected with actual poor relief. In particular cases, especially cases of contagious disease, the relatives of the insured are given similar treatment. Furthermore, these hospitals are no longer the dreaded institutions of the old days, but, precisely because they are financed in conjunction with the insurance authorities, they are provided with all the modern requirements of medical

science. They are also well constructed, so that old terror of such institutions has been entirely supplanted by the recognition of the value of hospital treatment.

Thus it has come about that not merely the insurance laws but also a poor law administered in a broader spirit have in the last 25 years made great advances in the provision of the public with doctors, apothecaries, and hospitals, as is indicated by the following statistics:

	1883	1906
Area in square kilometers	540,519	540,658
Population	46,013,900	61,176,659
Doctors:		
Number	15,100	31,346
Area per doctor (in square kilometers)	35.80	17.25
Number of doctors per 100 square kilometers	2.79	5.80
Number of inhabitants per doctor	3,047	1,952
Number of doctors per 10,000 inhabitants	3.28	5.12
Apothecaries:		
Number	4,483	6,189
Area per apothecary (in square kilometers)	120.57	87.36
Number of apothecaries per 100 square kilometers	0.83	1.14
Number of inhabitants per apothecary	10,264	9,885
Number of apothecaries per 10,000 inhabitants	0.97	1.01
	1882	**1906**
Hospitals:		
Total population	45,234,061	61,176,659
Number of hospitals	2,024	3,801
Number of persons per hospital	22,349	16,095
Number of persons per bed	545	275

When the hospital treatment is at an end, the relieving authorities by the use of public or privately contributed funds, seek to secure employment suited to the state of the patient's health, that he has a proper lodging and that he is relieved from the burdens of a numerous family.

In this manner the relieving authorities contribute to the guarantees of adequate provision against sickness.

In many ways the care of the aged by the relieving authorities has been transformed in the direction of a more distinctly social policy under the influence of workingmen's insurance. The old almshouses and homes for incurables have disappeared and given place to a variety of homes for the aged, which make their last years more cheerful and assure them more orderly and systematic care. The policy of the invalidity insurance institutions toward invalids is particularly important. Homes for the aged and retreats are frequently erected by the joint efforts of insurance institutions and the relieving authorities. The insurance institutions supply money for erecting the buildings and provide pensioners in such institutions whereby they pay the excess of cost of nursing over the rent.

There is a similar development in connection with orphans' homes, as is proved by the new Home for Orphans in Berlin, Jacobsstrasse 33.

The administration of poor relief has been influenced not merely by the socialistic spirit of the insurance legislation, but also by the policy of the private charitable agencies which has lately undergone a considerable development. The most diverse kinds of associations appear as pioneers in this or that field, which impinges upon the work of the relieving authorities; there is work for care of infants, for children, for home nursing, for the unemployed,[32] for tuberculosis, drunkenness, venereal diseases, cripples, etc. The relieving authorities assist these associations, working hand in hand with them. They make use of the institutions of these associations, at the cost of poor funds, or they assist these associations by other contributions in money; and they always take pains to insure that these funds are not given to the wards of the societies as poor relief in the strict sense of the word.[33] This is in marked contrast to the policy followed in England and North America. There the central problem of poor relief lies in the question of institutional relief, on the workhouse principle. In Germany it is coming more and more to be the object of administration to leave the way open for the pauper to return to a position of economic independence, to make the return as easy as possible, and with this in view to spare his sense of honor. For this reason, recipients of poor relief are so far as possible given the appearance of economically independent individuals.

Naturally all these factors increase the cost of poor relief. This is particularly true in the more prosperous places which regularly pursue a more generous policy and are in all cases the places which have made the greatest advance toward a broader social administration of poor relief. Thus the spirit of this social age regards as a duty the investigation of the causes of destitution and poverty; their prevention, as far as possible; the conversion of idle pensioners of a relieving authority into useful members of society; and, so far at least as it can properly be a concern of theirs, to create for these persons an existence worthy of men.

In no sense can this increase of expenditure for poor relief be attributed to an unfavorable influence of insurance legislation, still less does it signify an increase in poverty.

CONCLUSION.

The relations between insurance and poor relief are thus manifold. Sometimes their administrative measures are, to use the words of Flesch,[34] complementary, supplementary, or entirely distinct; sometimes they are directed toward widely separated fields of activity, and then again they are in the same field and neutralize one another.

The most important influence that workingmen's insurance has exerted upon poor relief is doubtless the reduction of the burden of

relief. This is now apparent both from the study of the extent of the benefits derived from the workingmen's insurance laws [35] and from the comparison between expenditures for insurance and for poor relief. Social insurance has held good in comparison with poor relief, just as hygiene has compared with medicine; it has reduced the total amount of destitution, which can be treated by poor relief only in particular cases. But for the insurance laws destitution would have been more general in the lower classes and the relieving authorities must needs have spent more in rendering assistance even in the most acute cases.

In the future this tendency toward a reduction of burdens will make itself more strongly felt. That is the impression from a study of insurance legislation and of the procedure of poor relief.

A large number of persons, who formerly occasioned great expenditure for poor relief, are now brought within the insured groups by the imperial insurance act of 1911 (widows and orphans in insurance on behalf of surviving dependents, servants, agricultural and forest laborers, and persons engaged in domestic industry in sick insurance), benefits paid to the insured having been extended by the act in many ways.[36] But apart from these changes the existing laws, particularly the invalidity laws, are steadily becoming more important from the standpoint of the relieving authorities by reason of the increased benefits to the insured. This increased significance of workingmen's insurance will be fully revealed only when the old body of recipients of alms have been taken from the jurisdiction of the relieving authorities by death or other causes, and the authorities deal with a generation that has grown up under the influence of workingmen's insurance. Then the poor funds will feel the effect not merely of the material assistance of the insurance laws, but also the moral advantages. The emphasis laid by insurance upon saving, self-control, and foresight is particularly notable in the case of workingmen's insurance in Germany. Where such economic foresight, self-control, and thrift are lacking the fundamental factors of destitution are active; it is a matter of experience, as E. von Philippovich rightly says, that general poverty is not only due to defective organization of production, but also to the lack of education and foresight of the workmen. The longer the idea of insurance exerts its educational influence in the above-mentioned practical direction, the more will the burden of poor relief be reduced.

The favorable influences of workingmen's insurance are thoroughly appreciated by the relieving authorities. They cooperate with this tendency by endeavoring to utilize the existing provisions and coordinate the benefits paid out by the insurance authorities to their own needs. They do this in many ways: By explaining to needy persons their claims upon the insurance authorities and thus keeping them

off the poor funds; by supplementing inadequate insurance benefits; and by assisting the insurance authorities in meeting certain general administrative expenses. Many poor authorities (for example, in Hamburg and Leipzig) undertake to pay out of public means the contributions to insurance funds due from persons then in receipt of poor relief, when this is necessary to maintain the claims upon the insurance authorities.[37] All this means that the advantages of the existing insurance legislation are becoming greater to all the participating classes. But at the same time, the poor-law administrations act in their own interest; relieved by social insurance, they get new means for the promotion of other tasks of poor relief.

Despite the reductions of the burden of relief by insurance already experienced and still to be expected, the statistics of poor relief (under the influence of various economic and social factors described above) show an increase in the number of persons relieved and an increase in expenditure which is likely to continue. Still, if it were not for workingmen's insurance and the private charity newly aroused by it, this increase would have been still greater. We see here, as in many other cases, that when cultural development seems to have solved one problem, new problems immediately arise; with the development of our culture new tasks are ever being created. Thus, the relieving authorities have found new channels for the expenditure of the means set free; sometimes by different treatment of particular cases, sometimes by the extension of relief to new cases.

In this way there has arisen a significant distinction between poor relief proper in the narrower sense of the term; namely, necessary provision for the destitute, and the modern social hygienic measures to anticipate and prevent destitution. The tasks of poor relief in the narrower sense have been diminished by workingmen's insurance; poor relief in the broader sense has been given a wider field of activity, which is still growing. The development of this new field is one of the causes of increased expenditure. This kind of poor relief, the social hygienic preventive type, should perhaps be distinguished from poor relief in the narrower legal sense and recognized as an independent branch, standing between insurance and poor relief, and without the civil disabilities of the latter.[38] Grants of relief of this intermediate character are already subject to the regulations of the imperial statute of March 15, 1909 (influence of grants of poor relief upon civil rights), and the corresponding State laws which remove the political disabilities.

If we adopt the metaphor of concentric circles used by Münsterberg with reference to the boundaries of poor relief and charity, we will see that the inner circle representing poor relief is diminished, thanks to workingmen's insurance. It includes all who are incapable of supporting and providing for themselves. But the circle

which stands in closest relation to the third representing the efforts to protect the individual by insurance is being enlarged, as are all the circles which represent charitable effort designed to prevent poverty.

This development is leading toward the results which Gustav von Schmoller expected of insurance.[39] It is destined, he thinks, entirely to supplant the still indispensable system of poor relief with its crude machinery and its ever-doubtful psychological and material results. There has also been fulfilled the prophecy made by that champion of workingmen's insurance, Albert Schäffle, in 1881, when he referred to this legislation from the standpoint of the creation of the highest social efficiency. (Aus meinen Leben, Zweiter Band, Berlin, 1905, S. 149.) He said:

> The highest aim of the statesman is not the wealth and strength of a few, but the greatest physical, material, and moral power of the people as a whole. By that power is determined the place of the nation in the struggle for existence. Hence, whatever insures the mass of the people against need and makes them more contented, whatever strengthens the sentiment of social solidarity, whatever promotes harmony between the classes and prevents unrest, whatever brings the beggar to a consciousness of the civic obligation to become economically independent, whatever protects countless powers from premature decay, whatever can raise the whole moral and political tone of the lower classes—all those things will be of inestimable value from the point of view of creating the maximum social efficiency. All that, however, involves obligatory insurance against misery and need.

The extent to which this end is furthered by the German system of insurance will be apparent from the preceding study. The German system includes the great mass of the working population, not merely the élite. It draws its resources from the two great powers in social life, the individual self-help and the action of the State. The superiority of this system over the voluntary insurance systems of other States will also be apparent to the reader. Our insurance system leads the masses of workingmen away from the idea of begging alms through an improved system of poor relief to the consciousness of a civic obligation to support themselves. Also, by permeating and transforming the system of poor relief, it works toward the realization of the highest social efficiency, the raising of the general tone of national life, and the increase of the economic output of the German nation.

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[1] This paper (in German) has been published, Archiv. für Sozialwissenschaft und Sozialpolitik. Vol. XXXV ("Arbeiterversicherung und Armenwesen in Deutschland, etc."). Tübingen, 1912.

[2] Cf. H. W. Farnam, The Psychology of German Workmen's Insurance, Yale Review, vol. 13, New Haven, 1904, pp. 99, f., 436; also F. Friedensburg, Die Praxis der deutschen Arbeitersicherung, Berlin, 1911 (translated from the German by Louis H. Gray, New York. The Workmen's Compensation Service and Information Bureau). Farnam misrepresents the relation of insurance to poor relief. With the same biased one-sidedness with which he describes the working of the insurance legislation, he

quotes from my report on Workingmen's Insurance and Poor Relief to the "Comité permanent des assurances sociales." He quotes merely the fact of increase in expenditure for poor relief and concludes that there has been no reduction of the burden of relief by reason of workingmen's insurance. He made no allusion to the facts brought forward by me which indicated a reduction of burdens. Neither did he refer to the fact that expenditures for poor relief had been increased by a variety of economic and social tendencies, and that expenditures would actually have been much greater than they were had it not been for workingmen's insurance. Such things are not surprising in a paper that has been discredited on account of its one-sidedness and overemphasis of isolated cases by all well-informed students and by the objective critics of workingmen's insurance in Germany. This paper is severely criticised by Kurt Weymann (Soz. Pol. Rundschau of May 3, 1911), K. Lange (Soz. Praxis of Apr. 13, 1911), in the Arbeiterversorgung of May 1, 1911, Robert Schmidt (Korrespondenzblatt der Generalkommission der Gewerkschaften Deutschlands of May 6, 1911), by the Norddeutsche Allgemeine Zeitung of May 19, 1911, by the Neue Preussische Kreuz-Zeitung of May 20, 1911, and further by Randolph T. Brodsky (the Survey, New York, 1912), by J. M. Rubinow (Political Science Quarterly, June, 1912, pp. 312, ff.), and by Wuermeling (Concordia, Zeitschrift für Volkswohlfahrt, Jan. 1, 1913).

[3] That is, the Empire, exclusive of Bavaria and (until Apr. 1, 1910) exclusive of Alsace-Lorraine. Cf. Statistik des Deutschen Reichs. N. F. Vol. 29; Paul Kollmann, Armenstatistik, Handwörterbuch der Staatswissenschaften, 3 ed. Vol. II, p. 182.

[4] Chr. Klumker, Armenstatistik einiger deutscher Städte für das Jahr 1896-97, Jena 1902; H. Silbergleit, Finanzstatistik der Armenverweltungen von 108 deutschen Städten. Schriften des deutschen Vereins für Armenpflege und Wohltätigkeit, 61. Heft; K. Singer, Untersuchungen über die persönlichen Verhältnisse der von der Armenpflege München unterstützen Personen im Jahre 1906, München 1908.

[5] Cf. Statistik der Arbeiterversicherung des Deutschen Reichs für die Jahre 1885–1906, für den VIII. Internationalen Arbeiterversicherungskongress in Rom 1908 vom Reichsversicherungsamt bearbeitet, p. 8.

[6] See the above mentioned, Statistik der Arbeiterversicherung 1885–1906, p. 18.

[7] The former limitations of freedom of movement, settlement, and marriage have since been repealed.

[8] Cf. A. W. Jebens, Armenunterstützung als politische "capitis diminutio." Preuss. Verwaltungsblatt of July 8, 1905.

[9] In the case of accident and invalidity insurance it is to be observed that many are enrolled who are not classified as workmen; in accident insurance, persons engaged in agriculture and many proprietors of small industrial establishments; in invalidity insurance, servants.

[10] For the development of the expenditures of Prussian cities (with over 25,000 inhabitants) for paupers, orphans, and hospitals, 1888, 1898, 1908, see H. Silbergleit, Preussens Städte 1908, p. 483, ff.

[11] See also the publications on the occasion of the anniversary of accident and invalidity insurance:

Das Jubiläum der Unfall- und der Invalidenversicherung. Bericht über die Feier. Berlin, 1910; Das Reichs-Versicherungs-amt und die Deutsche Arbeiterversicherung. Berlin, 1910; Handbuch der Unfallversicherung, dargestellt von Mitgliedern des RVA., 3 vols. (particularly vol. 3), Leipzig, 1910. Also my paper Arbeiterversicherung und Volkswohlfahrt im "Tag" Sozialpol. Rundschau of Dec. 20, 1910.

Unfallverhütung und Betriebssicherheit. Denkschrift des Verbandes der deutschen Berufsgenossenschaften. Berufsgenossenschaftliche Unfallverhütung 1885–1910 by K. Hartmann. Berlin, 1910.

1885–1910. 25 Jahre sozialer Mitarbeit, herausgegeben vom Verband der deutschen Baugewerksberufsgenossenschaften.

Die landwirtschaftliche Unfallversicherung 1888–1908. Herausgegeben von der Ständigen Kommission der deutschen landwirtschaftlichen Berufsgenossenschaften. Berlin, 1910.

25 Jahre Unfallverhütung, by E. Bauer and M. Gary, Schriften des Vereins deutscher Revisions-Ingenieure No. 10. Berlin, 1910.

Invalidenversicherung und Arbeiterwohlfahrt. Im Auftrag der deutschen Versicherungsanstalten herausgegeben (von Elle, Freund, Liebrecht und von Schmid. Berlin, 1910.)

Ferner Geschichte und Wirkungskreis des Reichsversicherungsamts Leipzig 1911; Kaufmann, Präsident des RVA., Die deutsche Arbeiterversicherung im Kampf gegen die Tuberkulose. Berlin, 1912.

[12] Statistics of sick insurance in 1908. Statistik des Deutsches Reichs. vol. 229, p. 9*; Statistisches Jahrbuch deutscher Städte 16 Jahrgang, 1909. p. 240.

[13] See my paper "Deutschlands wirtschaftliche Entwicklung unter besonderer Berücksichtigung der Volkszählung 1905 sowie der Berufs- und Betriebszählung 1907. Munchen, 1911. J. Schweitzer Verlag.

[14] Cf. III, pp. 54, ff.

[15] Report of Dr. Freund in the Schriften des Vereins für Armenpflege, etc., No. 21. My official report in the Vierteljahrsheften zur Statistik des Deutschen Reichs., 1897, II, p. 1, ff.

[16] For further particulars, see Zeitschrift des Bayer. Statistischen Landesamts. 1911. p. 12.

[17] *Arbeiterversicherung und Armenpflege, Zeitschrift für Sozialwissenschaft*, 1. Jahrgang, 1898, p. 96, ff.; also the Report by Brinkmann on *Die Armenpflege in ihren Beziehungen zu den Leistungen der Sozial-Gesetzgebung; Schriften des Vereins für Armenpflege und Wohltätigkeit*, vol. 21 (1897).

[18] Busch, Untersuchung über die Zusammensetzung und die Entwicklung der Unkosten der Armenverwaltung der Stadt Elberfeld 1881–1904. Elberfeld, 1906.

[19] According to Sigmund Schott, five-sixths of the persons relieved in Mannheim were born elsewhere.

[20] The jubilee publications cited, p. 396.

[21] E. von Philiprovich, Grundriss der Polit. Oekonomie, vol. 2, 2d part. Tübingen, 1907, p. 358. D. Grünspecht, Die Entlastung der öffentlichen Armenpflege durch die Arbeiterversicherung, Jahrbücher für Nat. Oekon. und Statistik, vol. 33, p. 68.

[22] According to the figures for various German areas on the date Jan. 1, 1910, the number of cases in which poor relief was granted to persons in receipt of (insurance) benefits varied in communes of less than 5,000 inhabitants from 20 to 60.5 per thousand; in communes of more than 5,000 inhabitants the number varied between 50.1 and 155.7 per thousand.

[23] See O. Landsberg, Die Aufwendungen der Magdeburger Armenverwaltung innerhalb der 20 Jahre 1889–1908. Mitteilungen des Statistischen Amts Magdeburg. No. 21, p. 2 ff.

[24] Persons can now acquire settlement after having maintained uninterrupted residence in the area of a municipal union for one year instead of two years, as formerly, and after 16 completed years instead of 18 completed years, as formerly.

[25] See Hammerschmidt, Die provinzielle Selbstverwaltung Westphalens, Beilage 26.

[26] Statistical data on the influence of the legislation on civic education upon the communal budget (not, however, going beyond the expenditure for the poor) are available in the following figures for Prussia, where the costs are divided, one-third being paid by the communal union, two-thirds by the State.

[27] Statistisches Jahrbuch für das Königreich Sachsen 1910, p. 200.

[28] Statistisches Jahrbuch für das Deutsche Reich 1910, p. 318.

[29] Korrespondenzblatt der Generalkommission der Gewerkschaften Deutschlands 1909, No. 32–40; Richard Calwer, Die Konjunktur, October, 1909, p. 7, ff.; Erfolge

der Gewerkschaftsbewegung im Bergbau; Christ. Gewerkschaftstag Köln, 1912, p. 14, ff.

[30] Statistisches Jahrbuch für das Deutsche Reich 1911, p. 325, ff. (Use of breadstuffs, coffee, rice, tea, sugar.)

[31] The slightness of the outlay of the poorer classes for purposes of health and the extent to which costly illnesses disturb the balance of their budgets are shown by the tables of the Erhebung von Wirtschaftsrechnungen minderbemittelter Familien im Deutschen Reiche. 2. Sonderheft zum Reichs-Arbeitsblatt 1909.—"Armut und Krankheit stehen in einer eigenartigen Beziehung der Wechselwirkung," in more than 75 per cent sickness is the cause of the existing need, and conversely poverty is favorable to the spread of the disease, prolongs its duration, and makes it harder to overcome, particularly if it is a contagious disease. A. Gottstein, Die Regelung des gemeindeärztlichen Dienstes, Medizinische Reform (herausgegeben von Lennhoff und Latz), 1909. Let us remember, too, Goethe's saying, "A healthy man without money is already half sick."

[32] The endeavor is always to assist by giving employment rather than money, thus bearing in mind the saying: "The daily alms of the rich supply but half the needs of the poor. Help him to help himself and you help him wholly."

[33] In the spirit of the circular letters of the imperial chancellor of Apr. 5, 1904, and Feb. 9, 1907, which suggested the formation of special funds whose expenditure for the assistance of poor consumptives in sanatoriums should involve none of the stigma of poor relief.

[34] Schriften des Deutschen Vereins für Armenpflege und Wohltätigkeit. Book 54, p. 11.

[35] See my development of this in the official documents: Einrichtung und Wirkung der deutschen Arbeiterversicherung, 2 ed. Berlin, 1904. p. 125, ff. Die deutsche Arbeiterversicherung als sociale Einrichtung, 3 ed. Berlin, 1906. p. 127, ff. Further, my report of Jan. 1, 1912, to the Comité permanent international des assurances sociales, Belastung durch die deutsche Arbeiterversicherung, printed in the Zeitschrift für die gesamte Versicherungs-Wissenschaft, Jahrgang, 1912.

[36] Gerischer, Die Reichsversicherungsordnung und ihre Bedeutung für die Armenpflege. Zeitschrift "Der Stadtverordnete" of Feb. 1 and 15, 1912.

[37] Deutscher Reichsanzeiger, Aug. 10, 1912, article on Aufgaben der Armenpflege in der Ueberwachung der Invalidenversicherung.

[38] A similar tendency is to be observed with reference to the general school tax, distribution of school supplies to poor children, also food given to school children, etc.

[39] Ueber einige Grundfragen der Socialpolitik und Volkswirtschaft. Leipzig, 1898, p. 103.

WOMAN IN INDUSTRIAL LIFE OF THE PRINCIPAL CIVILIZED NATIONS—A SOCIAL, DEMOGRAPHIC, HYGIENIC STUDY.

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I.

The most valuable asset of a nation is the people themselves. This asset, in amount and quality, is the organic national capital, forming the virgin soil of civilization and economic productivity. It must therefore be used so prudently that, without diminishing its intrinsic value, new developmental values arise out of this capital as simple

and compound interest. The utilization and development of the strength of the people must, therefore, take the form of an organic capitalization. It must conserve and advance the organic capital of the nation in quantity as well as in quality.

On closer consideration of the national capital our attention is usually directed in the first place to the male population. Hitherto, to be sure, the course of development and the present significance of the national capital have been decisively determined by the physical and intellectual strength of man, through the productive power which he exerts in the home as father of children and outside of the home as employer, as employee or workman in the several occupations, as a higher or lower official in the various branches of public administration, and as a leader or collaborator in public life.

But woman has also an equal share in the national capital. What she produces as mother and educator of the workers, as wife, the soul of the family, as worker in the house and outside, as coworker in the public service of society is so vitally important as to make her a vitally important productive and reproductive part of the national capital.

II.

Woman's vocation of motherhood is indeed the presupposition for our industrial life. Its significance can not be better characterized than by the fact that only nations possessing efficient mothers attain success. To quote Friedrich Naumann:

> Men invent tools; women bear children. Men forge arms; from mothers come the soldiers. Men rule; mothers contribute most to the greatness of the nation; they with their children are the transforming element. When the mothers of a nation grow weak, this collapse, notwithstanding all careful culture, means the decline of the nation into senility.

This characterization is clear without further comment and by no means exaggerated. Indeed, the maternal vocation includes not merely the bearing of children, but also solicitous care for them during infancy and childhood, and finally their education, which is essential in determining the trend of the intellectual life, the disposition and character of the growing generation.

As wife, woman has also an important mission in our industrial life. Through a well-ordered home, full of life and love, she must shape external conditions for the vocational work of the husband as favorably as possible, and must ease for him the struggle for existence through sympathetic interest, stand by him in good times and bad, and through counsel and encouragement strengthen and inspire him in his economic plans. The wife must be the soul of the family life, creating central power stations for the efforts of the husband and for the later activity of the children. She must guard the intellectual and moral possessions of the family life, which act by example through

moral conduct, sense of duty, simplicity, economy, and orderliness, and transmit to the children goods more valuable than money or estates.

That inclosure within which family life is passed and within which is found the richest fruition of family life, growing children, and the full community of life unfolded in fair exchange between husband and wife, sharing the goods and values of both their worlds, is the household. The activity of the housewife in managing the household is also something more than a mere private performance of a piece of work limited to the family. We all know how important a good housekeeper and manager is for safeguarding the fruits of industry. The wife increases the gain by orderly management, a task which is by no means easy. Quite frequently earning is easier than saving; from experience we know that all industry will not lead to prosperity, unless the wife is equal to the latter task. Likewise what she does in the way of preparing meals, nourishing the members of the household, what she observes in the way of cleanliness within the house, what hygienic precautions she takes to prevent sickness, as well as care for husband and children during sickness, are all done for the advantage and happiness of the family. By nursing and caring for living beings in the household, by counteracting the waste and destruction of human life, and by creating a condition whereby personality and individuality are asserted, she performs especially important services. For, indeed, the greatest asset of national economy is man, his health, his ability; indeed, society is nothing else than the collection of individualities. Without individual value there is no value in State, race, or society.

Closely related to her activity as mother, housekeeper, and wife, so to say, a concentric enlargement of this sphere of work, is the public-spirited activity of woman, which is also in the interest of general industrial life. In many instances women place themselves in the service of the public weal with understanding, energy, perseverance, and warm-hearted readiness to make sacrifices, and know how to obtain gratifying results where it is a question of palliating sickness and allaying need, removing difficulties in workers' lives, through welfare work for young persons and visiting nurse work, leveling social contrasts, and establishing harmony.

Finally, to a large extent, woman takes part directly in industrial life. As a result of the modern evolution of industry, commerce, and transportation, many an occupation exercised up till now by women in the household—such as spinning, sewing, knitting, baking, etc.—has been crowded out of the home. Thus the practicability and necessity of home production have been reduced, and the home economy has become more and more restricted to the regulation of consumption. The working force in the household which

in this manner has been set free looks abroad for occupation. Sometimes it is absolutely necessary for women to contribute to the support of the family by a gainful occupation of their own. This applies in some degree to married women. Spinsters and widows also are obliged in many instances to undertake vocations of their own, because not all of them can be provided for in the family without recourse to a gainful occupation. The modern economic system, on the other hand, with its intensive development, is more and more based on the supposition that female labor also must enter the service of national production because the work of men alone is no longer sufficient to the economic tasks of the nation.

The occupational activity of woman manifests itself in these five ways, as wife, mother, manager of a household, and as engaged in public and industrial work.

In each of them the performances of women have undergone a great change in the last decades.

From the point of view of motherhood one must point to the decline in the number of births. In women's life from puberty to old age the bearing and nursing of children are now more than formerly an episode, which recurs sometimes every three or four years, and exacts at most from 10 to 20 years of a woman's life. For, with the progress of civilization, there has come about a higher valuation of and care for all life, and with these an increase in the duration of human life and a decline in mortality. Because fewer men, and above all fewer infants, die there are, for mental, physiological, and economic reasons, fewer births. In addition, steadily increasing masses of the population recognize, with the progress of education, the fact that, in view of the increased cost of living and other difficulties connected with the rearing of children and the management of a household, a large number of children is of no benefit either to the family or to the individual child. The occupational activity of the wife outside of the home, moreover, makes the duties of maternity more difficult, so that maternity is quite frequently sacrificed to her occupational activity. As a consequence, the expenditure of reproductive energy is in these days much less than in former times. In a qualitative respect, however, there exists now a much greater sense of responsibility, manifesting itself in more careful bearing and rearing of children, and in more prudent care of the children; so that the decline in the number of children born is to some extent compensated.

The educational tasks of mothers have also changed and become narrower as compared with former times. Education and instruction have to a large extent been taken over by the State and by other public corporations. A trained force of teachers has largely relieved mothers from the education of their children. This profes-

sional education in masses requires, on the other hand, that parental education shall cultivate all the more the personality and individuality of their children, the care of soul and body, and the moral and inner life.

The task of woman as wife has likewise changed its character. With the increased physical and intellectual demands made upon the efficiency of man, the tasks of the wife became, necessarily, deeper and more refined. The wife must now possess more practical wisdom and be better educated, so that she may know how to treat her husband properly and may be able to identify herself in an intelligent manner with his interests. The same applies to her position as soul of the family.

The family life of to-day suffers greatly from the hurry and rush of its individual members after occupational gain outside of the family. Family ties have been somewhat loosened because the husband has to work the larger part of the day away from his family, and the children who earn a living of their own show a tendency to make themselves as independent as possible of the head of the family. So much the more it becomes the duty of the wife to elevate the family life to lend it a charm and to cherish the "family sense" in all its members. In this task she succeeds best by giving individuality to the family life and by the finer culture of daily life. The more routine the occupational life of man has become in this age of masses, machinery, and technique, the more it becomes true—as Rudolf Knauer pertinently remarks—that the individual can assert his individuality and fulfill his ardent wish to give individuality to his life only in the bosom of his family. The housewife, who has been somewhat relieved from the burden of mechanical housework by modern reforms, and who also has to take care of a household much smaller than in former times, must make her home the scene of a goodly portion of national culture.

But the present-day character of household economy in the interest of a rational regulation of consumption requires that the housewife must possess an increased administrative capacity, knowledge of merchandise for the purchase and preparation of food articles, knowledge of hygiene and the nutritive value of foodstuffs, capacity to husband her resources with the help of proper accounts, acquaintance with machines used in households, and, finally, a tact in her intercourse with the personnel of the household. As long as household economy was an economy of production, the housewife was in possession of this knowledge and disposed in the main of the products of her own economy. With the present-day change of the household economy, however, this knowledge is frequently lacking in the female population, and is especially necessary, because the housewife now has to do her managing with cash. Nearly nine-tenths of the hus-

band's earnings pass through the hands of the housewife for handling and use.

Such knowledge of domestic economy is especially desirable, because the food supplied by the housewife is of great influence upon the health, growth, and efficiency of the members of the family and their fitness for military service. The food must be conducive to maintaining a vigorous body. Not merely money is required, but also knowledge of household matters. Food enough may be obtained with modest means and vice versa—to quote Max Rubner—insufficient food may be due to poor management of the domestic budget, unsuitable combination, or lack of culinary knowledge. The dietary requirement of hygiene, a good combination of foodstuffs and nutritive elements, proper preparation, an intelligent use of luxuries, and, last not least, the determination of the menu are matters with which the modern housewife must be thoroughly familiar and which she must be able to put daily into practical use.

As regards the participation of woman in public life, her cooperation has been brought about to an increasing degree through the modern shaping of our economic and social conditions. Economic evolution has brought more pronounced social contrasts; the sharpened conscience of society has provided enlarged welfare work. In the effort to do justice to the increased social tasks the greater cooperation of woman has become indispensable. As a matter of fact, woman has cooperated liberally, and has contributed in a large measure to the elimination of social inequalities as well as to the broadening of moral culture.

Finally, the direct industrial activity of woman is especially worthy of notice.

The aid of wife and daughter in agriculture so long given, especially in peasant households, and in small-scale industrial establishments, is to-day even greater than in the past. It has also extended into other branches of commerce and industry. This aid is not merely incidental, but in many instances is the real occupation, household activities receding into the background both in extent and in time. Independent of the head of the family, women and girls, both unmarried and married, younger and older, are looking more and more for a gainful occupation of their own outside of the home. They find employment in factories, workshops, in agriculture, industry, trade, commerce, and transportation, and in the liberal professions (as teachers, artists, nurses, and in the public service). The positions which they occupy are in a measure the higher ones (as bookkeepers, office clerks, cashiers, etc.), but on the whole, they are mainly those of ordinary skilled and unskilled workers or domestic servants.

In Germany, for instance, the principal industrial activity of women is in agriculture—comprising nearly one-half of all women industrially employed. Then comes domestic service, followed by the clothing industries, textile industries, laundering and allied industries, the manufacture of foods and beverages, commerce, hotels, and restaurants; these industries including 84 per cent of all women gainfully employed.

This increase in the industrial activity of woman has not on the whole displaced male labor. The industrial development and growth of cities has created additional opportunities for employment in which women take part alongside of the men, while the men continue to supply the larger element in industrial labor. To be sure, the strong contrast which formerly existed between the work of men and women and which was so unfavorable for the latter has diminished. Men now turn their energies toward the new and more remunerative employments which technical development has opened, while women, as a rule, take up the places abandoned by the men, as, for instance, in agriculture, and those forms of labor to which by their nature they are better adapted. This influx of women into industrial life is favored by the inadequate supply of agricultural labor and by the increasing use of machinery which has simplified many forms of labor in large and small industries. The increasing participation of women in industrial life, as here noted, is the more noteworthy, when viewed in connection with the protective laws passed in several countries in the interests of health and morality and woman's vocation of motherhood. These laws have placed restrictions upon the employment of women, particularly married women, in factories. Economic motives actuating the employer and the woman worker have surmounted these obstacles. The employer has a larger demand for labor compelling him to enroll women, and frequently sees in women workers a more pliant, manageable, and cheaper working force than the men. The increased price of food and other necessities pushing up the cost of living has compelled women to accept industrial employment partly to meet their living expenses and partly to meet those of others dependent on them.

The training in mind and morals which vocational employment brings the woman is not to be underestimated. Through her occupation the woman worker learns—as Alice Salomon points out so pertinently—absolute punctuality, attention to details, orderliness; she learns to make use of all her energies, even though it be irksome at the time; she learns devotion to duty and acquires a store of experience—qualities, all of which benefit her in her vocation as mother and housewife. This training which a gainful occupation gives to woman adds a certain spiritual strength which prevents girls from

contracting unwise marriages and secures to wives an economic independence in case of the sickness, misfortune, or premature death of the husband.

On the other hand, there are serious objections—hygienic, ethical, and educational—to such gainful labor outside of the home. Woman's physique is more susceptible than that of the male to the injurious influences of industrial labor. The woman's system is taxed with sickness even more than it is at present through the ravages of anemia and chlorosis which are so widespread. The kind of labor which young girls have to perform in various establishments—work that is mostly one-sided, mechanical, irritating to the nerves on account of the continuous strain on attention—is rarely favorable to physical and mental development. On the whole, there is great danger that women are being given work which is not suited to their physique, and that even in industrial work otherwise suitable they themselves do not give thought enough to their health and to possible motherhood. It is for these reasons that premature births, miscarriages, barrenness, and permanent sickness occur so frequently among working women. The effect of industrial life outside of the household upon motherhood is unmistakable. Motherhood is either entirely sacrificed to industrial labor, or it has to suffer in its development, in the course of birth and during the necessary period of confinement. Likewise, activity outside of the household is injurious to the infant, even if it comes into the world capable of living. Women who nurse their children are rarely found among mothers who are employed outside of the house, because the outside employment requires the separation of mother and child. As a consequence, the child in many instances misses the breast feeding even if the mother, notwithstanding the small amount of care which she receives, should be able to do the nursing. Lack of nursing and nursing during too short periods after birth are frequently the cause of infant mortality or stunted growth.

In spite of this fact, women who work outside the home frequently neglect the very elements of nutrition. On beginning the day a warm breakfast is rarely taken; while the later meals, likewise, leave much to be desired. Then the badly nourished body is compelled to perform fatiguing service. Nature, of course, avenges herself for such irrational exploitation of health, the power of resistance, and the nervous system. Frequent illness, premature fading, and rapid aging are inevitable consequences. Furthermore, where the wife is often absent on account of her outside occupation, this neglect of diet affects the family unfavorably. The husband loses part of his working power, loses health, and shortens his life; the children are stunted in physical growth and mental development. The children, moreover, are exposed to moral dangers while the mother is daily absent

from home; they grow up more or less neglected. The supervision that may be given by others is rarely a sufficient substitute, for we know from experience that persons giving paid service, because they are themselves not under sufficient supervision, not sufficiently educated, and of course but little interested, do not give by any means the same service, as when the housewife is present, supervises, and works with them. Thus the advantages brought by an increased income which the housewife earns are, as a rule, more than offset.

In reviewing all the changes discussed above which have taken place in modern times in the status of woman in our industrial life, the student of social hygiene, the social reformer, and one who is interested in national and world politics will come to the conclusion that the utilization of the national wealth of woman's energy leaves much to be desired. Viewed historically and geographically it is true that with the advance in civilization the status of woman has generally improved and that the death rate of woman has decreased. Modern conditions, however, affect unfavorably the stability of the family, the maintenance of the individuality of woman, and the health and strength of the mother.

"Fewer reserves of money, more reserves of energy." This alone is the guaranty for permanent and growing material development as well as for increasing moral culture. This requires, however, that woman's energy, which concentrates in itself so much productive and reproductive power, shall be less exploited than it has been. The solicitude which looks only for the symptoms of this exploitation is not sufficient to bring about this change; it needs—to use the forceful expression of Gustav Tugendreich—a causal therapy which is intent on the diagnosis and cure of this fundamental evil. In other words, let there be better conservation of the energies of woman. In the midst of the economic and social struggle of our time we must preserve and strengthen woman in her assertion of self and help her to maintain her individuality while taking part in the industrial life. It is indeed an important though difficult task for political economy, social reform, and social hygiene.

To accomplish this task it is above all necessary that the weakened position of the family and the household be fortified. The home must have its own again. The married woman must be reserved for the family so that she may properly care for husband, children, and home, for only the wife can create a home. Without the home there is no family, there is no firm foundation for the survival of civilized society. Without the family there can be no growth of well-trained members, of men understanding the general welfare, there can be no sound morals and civilization among the nations.

Happy is the nation whose national wealth is of men that are true men and women that are true women.

IV.

The science of statistics, both in its national and international aspects, still has great problems to solve within the sphere discussed in the preceding sections. Even in countries with a well-developed statistical organization, reliable data needed to understand the economic situation of women are still lacking. In most civilized countries which publish annual statistics of births, deaths, and marriages we have only a comparison between the number of births and the total population or the population of child-bearing age, as the measure of the achievements of motherhood. Some of these results are given below, based on the work of Lucien March, "Statistique internationale du mouvement de la population:"

Legitimate births per 1,000 married women of the ages between 15 and 50 years.

Country.	1866 to 1875	Country.	1876 to 1885	Country.	1886 to 1895	Country.	1896 to 1905
France	172	France	167	France	150	France	134
Denmark	225	Hungary	234	Hungary	224	England and Wales	203
Sweden	235	Switzerland	239	England and Wales	229	Belgium	213
Norway	242	Sweden	240	Switzerland	230	Saxony	216
England and Wales.	252	Denmark	244	Sweden	231	Denmark	217
Ireland	260	Austria	246	Denmark	235	Italy	232
Saxony	262	Italy	248	Portugal	235	Scotland	235
Belgium	270	Ireland	250	Belgium	236	German Empire	243
Prussia	271	Englandand Wales	250	Servia	237	Prussia	250
Scotland	278	Finland	259	Ireland	245	Baden	251
Bavaria	282	Norway	262	Finland	246	Bavaria	259
Baden	288	Belgium	264	Baden	248	Wurttemberg	262
Netherlands	294	Baden	266	Italy	249	Ireland	264
		Saxony	267	Saxony	250	Netherlands	272
		German Empire	268	Austria	250		
		Scotland	271	Scotland	255		
		Prussia	273	German Empire	258		
		Bavaria	276	Norway	259		
		Wurttemberg	288	Wurttemberg	259		
		Netherlands	293	Bavaria	263		
				Prussia	265		
				Netherlands	286		

Country.	Number of infants annually born living per 1,000 persons of population.			Decrease during 20 years in per cent.	Number of infants annually born living per 1.000 women of the ages between 15 and 50 years.		
	1876–1885	1886–1895	1896–1905		1876–1885	1886–1895	1896–1905
German Empire	38.0	36.4	35.2	7.4	153	146	141
Austria	38.4	37.6	36.4	5.2	149	148	145
Italy	37.3	36.6	33.2	11.0	148	149	138
England	34.2	30.9	28.6	16.4	135	118	104
France	24.9	22.7	21.8	12.4	99	89	85
Netherlands	36.1	33.8	32.5	10.0	150	142	133
Belgium	31.7	29.4	28.8	9.1	132	118	114
Sweden	29.7	28.1	26.4	11.1	119	117	110
Norway	31.0	30.3	29.2	5.8	127	125	119
Denmark	32.1	30.5	29.4	8.4	133	128	118
Finland	36.1	33.0	31.9	11.6	142	135	130
Switzerland	29.9	28.1	28.2	5.7	117	110	110

If we desire to know to what extent a population can maintain itself through the number of births, then we must have data showing the births according to the age of the mothers. Such data are avail-

able in only few countries, e. g., in France, Sweden, Norway, Denmark, Austria, and some Australian States, while they are lacking in Germany and other countries.

Statistics relating to the duration and fertility of marriages are likewise defective. Efforts to remedy this are being made on the part of the International Statistical Institute as the result of a motion of Edmond Nikolai, who deserves our thanks. The corresponding work of Lucien March serves as a model for the new task. Up to the present time, statistics of infancy have not been developed in a manner commensurate with their importance, neither on a national nor on an international scale. Greater uniformity is needed in the collection and publication of important data of statistics of infancy—and these should be in the form of statistics which permit international comparisons. An international agreement should be secured on certain fundamental topics, such as children born living, stillbirths, breast-fed children, etc. The Third International Congress for the Protection of Infancy, which was in session in Berlin in September, 1911, in compliance with this desire, and on my motion, emphasized in a special resolution the great scientific and practical importance of statistics of infancy from the point of view of the past and future care of infants, and pointed out as highly desirable the bringing about of greater improvement and uniformity in the infancy statistics of the several countries. The International Association for the Protection of Infancy was requested to confer with the proper international associations, especially the committee of the Congress on Hygiene and Demography and the International Institute of Statistics.

Family statistics, as such, are also defective. The material relating to population statistics is usually shown for individuals and not for families. Few data relating to households are available, and these give a very inadequate picture of family life, of the symbiosis of old and young in that important social cell of the family, of the significance of the family within the national body, that is, within society.

Similar conditions exist regarding the statistics of women in industry. Woman as wife, as soul of the family, as educator of her children, is an ideal quite impossible of weighing, an entity which can not be given form in statistics.

On the other hand, the participation of women in industry should be a proper subject and a worthy task for statistics. Attempts to do justice to this task have already been undertaken; but great difficulties are to be overcome, and these attempts, therefore, are for the present still defective.

The difficulties are essentially the same as those connected with general occupational statistics. The first important question is whether the statistical investigation of occupation is made by a

special occupational census, as in Germany, or, whether the data are collected as part of a general census, as is done in most countries.

From experience we have learned that general schedules are filled in better if they are not overburdened; an investigation of occupations succeeds better if made as an independent investigation, and not so well if it takes place in connection with other and broader investigations. This applies especially to studies of women in industrial life, because the difficulties to be overcome therein are still greater than in investigations of the same nature relating to men.

So far as statistics of civilized countries concern themselves with women in industry, they are content in the main with a consideration of the gainful occupations of women, and based on this criterion they draw the dividing line between employed and supported women. As is proved by the questions and explanations on the schedules, and the instructions to the enumerators, only those women are counted, as a rule, among the industrial population whose labor is compensated with money (e. g., in the United States of America the classification is "gainful occupation," in France "profession rémunerée.")

And yet, in the most important branches of industry, such as agriculture, home industry, small-scale industry, the women of the family are a substantial economic aid, and contribute to the support of the family without as a rule receiving actual wages. This part of woman's industrial activity is entirely lost in the statistics, because the latter consider only the factor of compensation. Otherwise, it is taken into account in statistics only in so far as the persons filling in the schedules treat such activity as a gainful occupation. This enumeration, however, is effected with little uniformity, even in the same country at the same enumeration, or at subsequent like enumerations, and still less so internationally as between countries. Because of this formal assumption of statistics, the actual difference in the number of women industrially engaged as between different parts of the same country or between different countries is considerably distorted, so much so that only a defective comprehension of the actual differences is possible. Appreciating this fact several countries have endeavored to treat separately other members of the family in the establishment belonging to the head, and to consider them in working up the material. This is done generally in Germany, as also in Austria and Hungary, and in England, at least, in agriculture. ("relatives of farmer on the farm").

A further defect of statistics relative to women in industry is, that in many instances no attention is paid to those women who devote themselves primarily to their household, but in addition have a secondary occupation different from that of the head of the family. In so far as the secondary occupation is considered at all in modern statistics, e. g., in Germany and Austria, it is generally done only

with a view to note, in addition to the actual occupation, other opportunities for gainful employment. Secondary occupations without a principal occupation as a rule are left out of consideration. Those instances in which women without a principal occupation exercise also a secondary occupation (in addition to their household activity) either do not show at all in statistics, or, only in so far as this secondary occupation is mentioned in filling the schedules.

As regards the work of women in the household, none of the schedules for occupational statistics of civilized countries contain any data. Only in isolated instances is the work of those members of the family who attend to the household duties considered among subsidiary occupations (e. g., in Switzerland); but even here, although woman's household work appears to be one of the most important sources of industrial advantage, women so engaged are not considered as economically employed, but as supported.

However, an extension of occupational statistics is not expedient, in spite of the great importance of the household activity of woman. Drawing a dividing line at the time of filling in the schedules between persons active in the household and those merely supported is too difficult, and valuable results could not be expected.

In view of the defects mentioned, defects which are found in all statistics relating to women in industry, conclusions may be drawn only with many reservations. Comparisons between periods of time, as well as international comparisons, are made very difficult as a consequence of these formal statistical assumptions. The official publications themselves in many instances call attention to this fact. Even a careful examination of the details of the methods of the various investigations throws but little light on the question as to what part the formal statistical assumptions on the one hand and the actual conditions on the other have had in causing the difference between different periods and countries.

International comparison is further affected by the diversity in the censuses of the individual countries. In some countries, for instance, the distinction between the gainfully employed and the supported persons is made according to entirely differing principles. Domestic servants, for example—numerically the most frequent occupation of woman—are frequently not counted at all among the working population. In like manner the statistics of the various countries treat differently the child-working population, persons receiving industrial training, as well as inmates of institutions, persons receiving poor relief, etc. Great diversities are further caused when one comes to consider those women who aid the head of the family in his occupation and those who follow outside work as a subsidiary occupation. Thus, for instance, if in one agricultural country the members of the family assisting on the farm are included,

the number of employed women is shown as considerably greater than in another agricultural country where such women are not considered in the occupational census.

A comparison of the total figures on women in industry can not therefore be made in a way that is free from objection. This applies also to similar figures for both sexes together, because these also are affected by the defective enumeration of women in industry. International statistics would therefore do well to consider the figures relating to occupations separately for both sexes, and for the present to pay more attention to the figures for the male sex, and use those for women only with the greatest reservation.

On the basis of the statistical material available there are compiled below five international statistical statements. They consider:

I. The share of woman in the industrial life of the population.

II. The nature of the work of woman in industry and its relation to the male industrial activity classified by branches of industry.

III. Social classification of working women.

IV. Age of working women.

V. Family status of working women.

In the compilation of these statements the data have been reproduced as presented according to the special census method of each country. In the arrangement according to principal occupation groups and social classes the systems of the individual countries were followed as closely as possible. The value of the table lies more in the comparison of the data of the individual country in point of time than in the international comparison.

The work of women in industry, as an inspection of the tables shows, is growing notably in nearly all civilized countries. Approximately three-tenths of the female population take active part in industrial life. Compared with the male industrial population, one-third of the entire industrial strength is to be credited to the women in the population. In some occupations (e. g., in domestic service, agriculture, and in certain branches of industry) the number of women employed is greater than that of men.

However embryonic in its present shape this compilation may be, and however much it may be burdened with defects due to the nature of the material, it may at least give an impulse to the better cultivation and further extension of the whole field of the statistics of women in industry in the several countries as well as internationally.

I. *Share of the woman in the industrial life of the population.*

Country.	Date of census.	Total population.			Wage earners.			Per cent of wage earners in specified population.			Per cent of women among wage earners.
		Total.	Female.	Male.	Total.	Female.	Male.	Total.	Female.	Male.	
Germany	June 12, 1907	61,720,529	31,259,429	30,461,100	28,092,117	9,492,881	18,599,236	45.5	30.4	61.1	33.8
	June 14, 1895	51,770,284	26,361,123	25,409,161	22,110,191	6,578,350	15,531,841	42.7	25.0	61.1	29.8
	June 5, 1882	45,222,113	23,071,364	22,150,749	18,956,932	5,541,517	13,415,415	41.9	24.0	60.6	29.2
Austria	Dec. 31, 1900	26,150,708	13,298,015	12,852,693	14,587,352	6,306,711	8,280,641	55.8	47.4	64.4	43.2
	Dec. 31, 1890	23,895,413	12,206,284	11,689,129	14,025,564	6,245,073	7,780,491	58.7	51.2	66.6	44.5
Hungary	Dec. 31, 1900	19,254,559	9,672,407	9,582,152	8,830,995	2,668,697	6,162,298	45.9	27.6	64.3	30.2
	Dec. 31, 1890	17,463,791	8,795,616	8,668,175	7,766,184	2,273,894	5,492,290	44.5	25.9	63.4	29.3
Switzerland	Dec. 1, 1900	3,315,443	1,688,418	1,627,025	[b] 1,543,259	[b] 486,375	[b] 1,056,884	46.5	28.8	65.0	31.5
	Dec. 1, 1888	2,917,754	1,500,180	1,417,574	1,293,823	424,106	869,717	44.3	28.3	61.4	32.8
France	Mar. 4, 1906	38,844,653	19,744,932	19,099,721	20,720,879	7,693,412	13,027,467	53.3	39.0	68.2	37.1
	Mar. 21, 1901	38,450,788	19,533,899	18,916,889	19,715,075	6,804,510	12,910,565	51.3	34.8	68.2	34.5
	Mar. 29, 1896	38,269,011	19,346,360	18,922,651	18,970,493	6,411,223	12,559,270	49.6	33.1	66.2	33.8
Italy	Feb. 10, 1901	32,475,253	16,320,123	16,155,130	16,272,526	5,284,064	10,988,462	50.1	32.4	68.0	32.5
	Dec. 31, 1881	28,459,628	14,194,245	14,265,383	15,151,908	5,701,275	9,450,633	53.2	40.2	66.2	37.6
Belgium	Dec. 31, 1900	6,693,548	3,368,714	3,324,834	3,300,149	983,386	2,316,763	49.3	29.2	69.7	29.8
	Dec. 31, 1890	6,069,321	3,042,367	3,026,954	2,939,388	882,219	2,057,169	48.4	29.0	68.0	30.0
Netherlands	Dec. 31, 1899	5,104,138	2,583,535	2,520,603	1,923,635	433,399	1,490,236	37.7	16.8	59.1	22.5
	Dec. 31, 1889	4,511,415	2,282,928	2,228,487	1,652,729	353,059	1,299,670	36.6	15.5	58.3	21.4
Denmark	Feb. 1, 1901	2,449,540	1,256,092	1,193,448	1,236,951	430,199	806,752	50.5	34.2	67.6	34.8
	Feb. 1, 1890	2,172,380	1,113,223	1,059,157	899,184	265,916	633,268	41.4	23.9	59.8	29.6
Sweden	Dec. 31, 1900	5,136,441	2,630,005	2,506,436	2,279,845	745,196	1,534,649	44.4	28.3	61.2	32.7
	Dec. 31, 1890	4,784,981	2,467,794	2,317,187	2,050,919	672,480	1,378,439	42.9	27.3	59.5	32.8
Norway	Dec. 3, 1900	2,221,477	1,154,784	1,066,693	984,877	339,903	644,974	44.3	29.4	60.5	34.5
					(1,391,909)	(745,220)	(646,689)	(62.7)	(64.5)	(60.6)	(53.5)
England and Wales	Jan. 1, 1891	1,988,674	1,037,384	951,290	1,276,260	688,075	588,185	64.2	66.3	61.8	53.9
	Mar. 31, 1901	32,527,843	16,799,230	15,728,613	14,328,727	4,171,751	10,156,976	44.1	24.8	64.6	29.1
	Apr. 5, 1891	29,002,525	14,949,624	14,052,901	12,899,484	4,016,230	8,883,254	44.5	26.9	63.2	31.1
Scotland	Mar. 31, 1901	4,472,103	2,298,348	2,173,755	1,982,812	591,624	1,391,188	44.3	25.8	64.0	29.8
	Apr. 5, 1891	4,025,647	2,082,930	1,942,717	1,776,952	556,564	1,220,388	44.1	26.7	62.8	31.3
Ireland	Mar. 31, 1901	4,458,775	2,258,735	2,200,040	1,963,817	549,874	1,413,943	44.0	24.3	64.3	28.0
	Apr. 5, 1891	4,704,750	2,385,797	2,318,953	2,145,729	641,410	1,504,319	45.6	26.9	64.9	29.9
United States	June 1, 1900	75,994,575	37,178,127	38,816,448	29,073,233	5,319,397	23,753,836	38.3	14.3	61.2	18.3
	June 1, 1890	62,622,250	30,554,370	32,067,880	22,735,661	3,914,571	18,821,090	36.3	12.8	58.7	17.2
	June 1, 1880	50,155,783	24,636,963	25,518,820	17,392,099	2,647,157	14,744,942	34.7	10.7	57.8	15.2
Australia	Mar. 31, 1901	3,773,801	1,795,873	1,977,928	1,638,656	354,522	1,284,134	43.4	19.7	64.9	21.6
British India [a]	Mar. 15, 1901	294,360,000	144,409,000	149,951,000	138,700,000	43,000,000	95,700,000	47.1	29.8	63.8	31.0
New Zealand	1906	888,570	417,560	471,010	399,080	75,240	323,840	44.9	18.0	68.8	18.9
Egypt [a]	1907	11,287,359	5,620,285	5,667,074	5,699,279	2,390,542	3,308,737	50.5	42.5	58.4	41.9
Cape Colony [a]	Apr. 17, 1904	2,409,810	1,190,870	1,218,940	1,588,090	776,460	811,630	65.9	65.2	66.6	48.9

[a] According to D. Webb, Statistics of the World, 1911, and Statesman's Yearbook, 1911.

[b] Without assisting members of the family.

I. *Kinds of occupation of women and their proportion to the occupation of men according to particular branches of industry.*

Country.	Census year.	Women wage earners.																				
		Agriculture.			Manufacture.			Commerce and transportation.			Public office and professional occupations.			Domestic and personal service.			Others.			Total.		
		Total.	Per cent of wage earners of every branch. Female.	Per cent of wage earners of every branch. Both sexes.	Total.	Per cent of wage earners of every branch. Female.	Per cent of wage earners of every branch. Both sexes.	Total.	Per cent of wage earners of every branch. Female.	Per cent of wage earners of every branch. Both sexes.	Total.	Per cent of wage earners of every branch. Female.	Per cent of wage earners of every branch. Both sexes.	Total.	Per cent of wage earners of every branch. Female.	Per cent of wage earners of every branch. Both sexes.	Total.	Per cent of wage earners of every branch. Female.	Per cent of wage earners of every branch. Both sexes.		Per cent of wage earners of every branch. Female.	Per cent of wage earners of every branch. Both sexes.
Germany [a]	1907	4,598,986	48.4	46.5	2,103,924	22.2	18.7	931,373	9.8	26.8	288,311	3.0	16.6	1,249,383	13.2	98.8	320,904	3.4	68.0	9,492,881	100	33.8
	1895	2,753,154	41.9	33.2	1,521,118	23.1	18.4	579,608	8.8	24.8	176,648	2.7	12.4	1,313,957	20.0	98.1	233,865	3.5	54.1	6,578,350	100	29.8
	1882	2,534,909	45.7	30.8	1,126,976	20.3	17.6	298,110	5.4	19.0	115,272	2.1	11.2	1,282,414	23.2	97.0	183,836	3.3	46.2	5,541,517	100	29.2
Austria	1900	4,122,859	65.4	50.2	717,898	11.4	22.9	296,798	4.7	28.6	712,948	11.3	41.3	456,208	7.2	95.3	.....	.....	.....	6,306,711	100	43.2
	1890	4,304,581	68.9	50.8	725,037	11.6	25.2	248,718	4.0	29.4	542,350	8.7	39.5	424,387	6.8	93.0	.....	.....	.....	6,245,073	100	44.5
Hungary	1900	1,821,339	68.3	30.1	194,972	7.3	16.4	48,394	1.8	13.3	36,929	1.4	10.7	350,572	13.1	91.0	216,491	8.1	43.6	2,668,697	100	30.2
	1890	1,471,361	64.7	27.1	134,925	5.9	14.3	41,217	1.8	15.7	24,631	1.1	8.8	352,714	15.5	93.7	249,046	11.0	51.9	2,273,894	100	29.3
Switzerland	1900	80,371	16.5	16.5	233,912	48.1	33.7	65,100	13.4	32.2	24,221	5.0	33.3	71,921	14.8	98.6	10,850	2.2	73.8	486,375	100	31.5
	1888	92,594	21.8	18.8	200,176	47.2	37.0	40,546	9.6	31.7	14,836	3.5	29.3	67,693	16.0	98.9	8,261	1.9	55.6	424,106	100	32.8
France	1906	3,330,011	43.3	48.6	2,518,402	32.7	34.9	779,164	10.1	37.7	293,100	3.8	18.0	772,735	10.1	81.7	.....	.....	.....	7,693,412	100	37.1
	1901	2,663,352	39.2	32.3	2,359,600	34.7	33.7	697,361	10.2	37.1	295,879	4.3	18.3	783,814	11.5	82.0	4,504	.1	23.9	6,804,510	100	34.5
	1896	2,759,829	43.0	32.5	2,068,784	32.3	32.5	577,497	9.0	34.9	257,355	4.0	17.2	731,523	11.4	81.0	16,235	.3	38.2	6,411,223	100	33.8
Italy	1901	3,200,302	60.6	33.1	1,371,426	26.0	34.4	170,905	3.2	14.3	138,451	2.6	16.4	402,980	7.6	70.1	.....	.....	.....	5,284,064	100	32.5
	1881	3,101,163	54.4	36.0	1,943,899	34.1	46.0	145,321	2.6	16.1	98,690	1.7	13.4	412,202	7.2	61.0	.....	.....	.....	5,701,275	100	37.6
Belgium [b]	1900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[c] 983,386	100	.....
	1890	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[c] 882,219	100	.....
Netherlands	1899	80,138	18.5	13.5	87,174	20.1	13.4	49,455	11.4	14.9	26,974	6.2	23.0	189,581	43.7	96.0	77	-.1	.2	433,399	100	22.5
	1889	72,932	20.7	13.5	65,668	18.6	12.3	37,107	10.5	13.8	19,644	5.6	16.5	157,173	44.5	94.4	535	.1	2.1	353,059	100	21.4
Denmark	1901	149,990	34.9	28.2	67,055	15.6	24.3	23,576	5.5	18.0	15,208	3.5	28.1	97,615	22.7	85.8	76,755	17.8	58.4	430,199	100	34.8
	1890	30,951	11.6	14.1	40,729	15.3	20.4	8,957	3.4	12.9	8,355	3.2	15.7	144,461	54.3	49.5	32,463	12.2	56.9	265,916	100	29.6
Sweden	1900	262,770	35.3	26.7	51,263	6.9	12.4	23,303	3.1	15.7	20,928	2.8	21.9	155,129	20.8	72.9	231,803	31.1	54.3	745,196	100	32.7
	1890	242,914	36.1	25.7	29,838	4.4	11.3	12,812	1.9	12.5	14,193	2.1	16.6	162,704	24.2	68.4	210,019	31.3	50.3	672,480	100	32.8
Norway	1900	72,013	21.2	20.0	65,468	19.3	27.0	28,268	8.3	23.1	10,726	3.1	29.9	[c] 103,539	30.5	87.3	59,889	17.6	56.6	339,903	100	34.5
	1891 [d]	87,120	12.7	22.7	50,155	7.3	28.3	15,181	2.2	16.6	7,486	1.1	27.8	459,149	66.7	96.7	68,984	10.0	56.9	688,075	100	53.9

England and Wales	1901	57,730	1.4	6.5	2,023,388	48.5	24.2	78,769	1.9	4.2	321,142	7.7	33.2	1,690,722	40.5	84.8	.....	.....	.....	4,171,751	100	29.1
	1891	52,026	1.3	3.9	1,840,898	45.8	25.1	35,358	.9	2.5	328,393	8.2	35.5	1,759,555	43.8	92.6	.....	.....	.....	4,016,230	100	31.2
Scotland	1901	40,730	6.9	17.2	319,049	53.9	26.6	24,136	4.1	9.8	33,234	5.6	32.9	174,475	29.5	86.7	.....	.....	.....	591,624	100	29.8
	1891	30,082	5.4	12.1	290,368	52.2	28.1	10,276	1.8	5.7	35,787	6.4	32.1	190,051	34.2	93.6	.....	.....	.....	556,564	100	31.3
Ireland	1901	85,587	15.6	9.8	233,256	42.4	36.5	5,026	.9	5.1	32,674	5.9	24.9	193,331	35.2	88.1	.....	.....	.....	549,874	100	28.0
	1891	91,068	14.2	9.7	252,255	39.3	38.4	2,161	.3	2.6	75,272	11.8	35.1	220,654	34.4	86.5	.....	.....	.....	641,410	100	29.9
United States	1900	977,336	18.4	9.4	1,312,668	24.7	18.5	503,347	9.4	10.6	430,597	8.1	34.2	2,095,449	39.4	37.5	.....	.....	.....	5,319,397	100	18.3
	1890	678,884	17.3	7.9	1,027,928	26.3	18.1	228,421	5.8	6.9	311,687	8.0	33.0	1,667,651	42.6	39.5	.....	.....	.....	3,914,571	100	17.2
	1880	594,510	22.5	7.7	631,034	23.8	16.7	62,852	2.4	3.4	177,255	6.7	29.4	1,181,596	44.6	34.5	.....	.....	.....	2,647,157	100	15.2
Australia	1901	38,944	10.9	7.3	75,570	21.3	17.7	37,943	10.7	11.0	41,235	11.7	37.1	150,701	42.5	75.0	10,129	2.9	45.2	354,522	100	21.6
British India *f*	1901	27,868,000	64.8	30.7	9,585,000	22.3	40.5	300,000	.7	9.5	429,455	1.0	10.2	1,806,000	4.2	32.4	3,010,545	7.0	27.0	43,000,000	100	31.0
New Zealand *f*	1906	3,450	4.6	3.4	18,500	24.6	13.2	9,380	12.4	11.7	10,520	14.0	38.8	30,210	40.2	75.9	3,180	4.2	28.1	75,240	100	18.9
Egypt *f*	1907	57,213	2.4	2.4	19,916	.8	5.2	7,675	.3	2.9	8,706	.4	3.5	2,291,251	95.9	97.1	5,781	.2	5.5	2,390,542	100	41.9
Cape Colony *f*	1904	485,240	62.5	48.1	9,030	1.2	5.1	3,460	.4	5.0	9,210	1.2	24.0	261,580	33.7	93.8	7,940	1.0	55.2	776,460	100	48.9

a Wage earners, excluding persons who are without occupation or making no return, but including domestic servants. Especially housewives are not counted, as they are not engaged in a specific occupation.

b Classification according to above table headings not possible, since the Belgian classification is from a different point of view. (See text.)

c Berufsfälle=Cases of occupation.

d Data for 1891 not comparable with 1900, since methods of enumeration are different.

e Einschliesslich Taglöhnerinnen=Including women who work by the day.

f According to D. Webb, Statistics of the World, 1911, and Stateman's Harbook, 1911.

APPENDIX (TO II).

Country.	Census year.	Women engaged in subsidiary occupations.		Country.	Census year.	Women engaged in subsidiary occupations.	
		Total.	Per cent of working population.			Total.	Per cent of working population.
Germany	1907	*a* 3,396,600	45.2	Hungary	1900	*a* 915,655	35.0
	1895	*a* 1,746,326	35.3	Switzerland	1900	170,946	35.1
	1882	*a* 1,115,076	26.2	Italy	1901	192,187	3.6
Austria	1900	168,859	22.1				
	1890	120,203	20.5				

a Cases of subsidiary occupations.

III. *Social classification of working women (including domestic servants).*

Country.	Census year.	Independent.			Officials.			Female laborers.			Among female laborers there are—				Others.			Total.		
		Number.	Per cent of working women.	Per cent of workingmen who are independent.	Number.	Per cent of working women.	Per cent of workingmen who are officials.	Number.	Per cent of working women.	Per cent of workingmen who are laborers.	Assisting members of the family.	Per cent of working women.	Domestic servants.	Per cent of working women.	Number.	Per cent of working women.	Per cent of workmen not classified.	Number.	Per cent.	Per cent.
Germany	1907	1,197,593	12.6	26.3	192,619	2.0	10.8	8,102,669	85.4	62.9	3,177,734	33.5	1,249,383	13.2				9,492,881	100	100
	1895	1,171,445	17.8	30.7	54,042	.8	4.9	5,352,863	81.4	64.4	1,158,944	17.6	1,313,957	20.0				6,578,350	100	100
	1882	1,079,131	19.5	33.3	24,212	.4	3.1	4,438,174	80.1	63.6			1,282,414	23.2				5,541,517	100	100
Austria	1900	1,171,713	18.6	37.9	67,905	1.1	4.6	5,067,093	80.3	57.5	3,020,227	47.9	456,208	7.2				6,306,711	100	100
	1890	955,524	15.3	37.1	42,518	.7	6.4	5,247,031	84.0	56.5	(a)	(a)	424,387	6.8				6,245,073	100	100
Hungary	1900	424,188	15.9	35.4	b 34,057	1.3	3.2	c 2,210,452	82.8	61.4			350,572	13.1				2,668,697	100	100
	1890	336,141	14.8	41.3	b 21,121	.9	2.8	c 1,916,632	84.3	55.9			352,714	15.5				2,273,894	100	100
Switzerland	1900	89,493	18.4	31.8	41.342	8.5	8.8	280,897	72.5	58.8			71,921	14.8	2,722	0.6	0.6	e 486,375	100	100
	d 1888	70,547	16.6	37.7				299,225	70.6	57.6			67,693	16.0	f 54,334	12.8	4.8	424,106	100	100
France	1906	2,782,724	36.2	26.9	356,136	4.6	13.5	2,533,006	32.9	41.3			(g)		h 2,021,546	26.3	18.3	7,693,412	100	100
	1901	1,933,365	28.4	22.8	41,4371	6.1	15.5	2,552,298	37.5	39.8			(g)		h 1,899,255	28.0	21.9	i 6,799,289	100	100
	1896	1,630,848	25.5	22.0				3,004,407	47.1	52.2					h 1,747,403	27.4	25.8	i 6,382,658	100	100
Italy	1901	Social classification for each occupation carried out from a different point of view. Therefore information for all occupations is not possible.																5,284,064		
	1891																	5,701,275		
Belgium	1900	53,931	16.7	15.6	555	.2	1.9	268,237	83.1	82.4								j 322,723	100	
	1890	42,562	16.7	18.7	775	.3	1.9	211,664	83.0	79.4								j 255,001	100	
Netherlands	1899	k 92,696	42.8		10,082	4.7		113,989	52.5									j 216,767	100	100
	1889	k 70,759	40.2		5,245	3.0		99,703	56.8									j 175,707	100	100
Denmark	1901	57,979	24.1	36.1	12,156	5.1	6.6	170,486	70.8	57.3								j 240,621	100	100
	l 1890	49,691	61.6	67.6	30,996	38.4	32.4											j 80,637	100	100
								Dependents.												
Sweden	1900	322,700	43.3	61.7				422,496	56.7	38.3			155,129	20.8				745,196	100	100
	1890	279,279	41.5	58.5				393,201	58.5	32.5			162,704	24.2				672,480	100	100
Norway	1900	m 66,989	19.7	33.7	6,001	1.8	3.3	n 207,024	60.9	55.9			87,804	25.8	o 59,889	17.6	7.1	339,903	100	100
	p 1891																			
England and Wales	1900	q 38,785	1.9	5.2	r 346,756	17.0	7.9	s 1,624,959	79.6	86.3					30,644	1.5	.6	t 2,041,144	100	100
	u 1891	61,160	3.4	9.7	263,146	14.7	9.0	1,309,672	73.2	76.8					155,724	8.7	4.5	1,789,702	100	100
Scotland	1901	q 5,686	1.8	5.9	r 42,418	13.3	3.7	s 270,245	84.7	90.3					700	.2	.1	v 319,049	100	100
	1891	q 7,316	2.8	9.1	r 37,914	14.5	7.8	s 210,716	80.7	81.1					5,159	2.0	2.0	v 261,105	100	100

Ireland	1900																	549,874		
	1891																	641,410		
United States[w]	1900																	5,319,397		
	1890																	3,914,571		
	1880																	2,647,157		

[a] Not separated.
[b] Officials.
[c] Other assistants.
[d] Social classification (1888) according to different point of view from 1900, therefore only limited comparison possible.
[e] Without assisting members of family.
[f] Proportion not to be calculated.
[g] See text.
[h] Includes unemployed men and working women and "isolées" women engaged in performing work carried on at home.
[i] Excluding persons whose social position was not found out.
[j] Social classification carried through for only a few groups of occupations.
[k] Contractors on their own or others' account.
[l] 1890 only classified as to chiefs and assistants.
[m] Private independent wage earners, independent artisans, etc.
[n] Servants of private workers and domestic servants.
[o] Without closer statement of occupation, Rentier, etc.
[p] Comparison with 1891 impossible, since social classification is from different standpoint.
[q] Employers.
[r] Working on own account.
[s] Working for employers.
[t] Among them 363,268 women laborers at home. (See note 8.)
[u] Not to be compared with 1901 for formal statistical reasons.
[v] Among them (1901) 28,390 women laborers at home. (See note 8.)
[w] Social classification not contained in official publications.

IV. *Age classification of working women.*

Country.	Date.	Per cent distribution of working women.						
Germany		*Under 20:*	*20 to 29:*	*30 to 39:*	*40 to 49:*	*50 to 59:*	*60 to 69:*	*70 and over and unknown:*
	1907	27.3	27.7	15.5	12.8	9.7	5.5	1.5
	1895	30.5	30.1	12.4	10.4	9.3	5.4	1.9
	1882	30.3	30.8	11.8	10.6	9.2	5.7	1.6
Austria [a]		*20 and under:*	*21 to 30:*	*31 to 40:*	*41 to 50:*	*51 to 60:*	*61 to 70:*	*71 and over:*
	1900	(24.0) 23.0	(22.3) 21.1	(16.6) 16.9	(14.3) 14.9	(11.7) 12.3	(7.5) 8.0	(3.6) 3.8
	1890	23.0	22.0	16.8	15.1	12.1	7.6	3.4
Hungary		*7 to 19:*	*20 to 39:*		*40 to 59:*		*60 and over:*	
	1900	28.9	37.0		24.5		9.6	
	1890 [b]							
Switzerland [c]		*Under 20:*	*20 to 29:*	*30 to 39:*	*40 to 49:*	*50 to 59:*	*60 to 69:*	*70 and over and unknown:*
	1900	21.4	30.3	15.7	12.0	10.5	7.2	2.9
	1888	19.2	29.9	16.0	14.3	11.2	7.2	2.2
France	1906	15.4	23.2	19.3	17.1	13.4	8.5	3.1
						50 to 64:	*65 and over:*	
	1901	20.1	20.8	19.0	16.2	17.7	6.2	
		Under 25:	*25 to 34:*	*35 to 44:*	*45 to 54:*	*55 to 64:*	*65 and over:*	
	1896	29.4	19.9	16.8	14.8	10.4	8.7	
Italy [d]								
Belgium [e]								
Netherlands		*Under 16:*	*23 to 35:*	*36 to 50:*		*51 to 60:*	*61 to 70:*	*71 and over:*
	1899	8.2	28.3	14.3		7.8	5.3	2.1
	1889	7.3	28.1	15.2		8.7	5.9	2.1
		16 to 22:						
	1899	34.0						
	1889	32.7						
Denmark		*Under 15:*	*18 to 24:*	*30 to 59:*			*60 and over:*	
	1901	13.4	23.8	26.2			17.0	
	1890 [b]							
		15 to 17:	*25 to 29:*					
	1901	11.3	8.3					
Sweden [e]								
Norway		*15 to 24:*	*25 to 34:*	*35 to 44:*	*45 to 54:*	*55 to 64:*	*65 to 74:*	*75 and over:*
	1900	26.6	20.1	16.7	13.9	10.0	7.8	4.9
	1891	25.5	21.0	17.0	13.2	11.3	8.2	3.8
England and Wales		*10 to 14:*	*20 to 24:*	*35 to 44:*	*45 to 54:*	*55 to 64:*	*65 to 74:*	*75 and over:*
	1901	4.8	22.2	11.2	7.8	5.1	2.3	0.5
	1891	6.5	20.3	10.7	8.2	5.4	3.1	
		15 to 19:	*25 to 34:*					
	1901	25.9	20.2					
	1891	27.0	18.8					

Scotland		*Under 15:*	*25 to 34:*	*35 to 44:*	*45 to 54:*	*55 to 64:*	*65 and over:*
	1901	4.8	19.7	10.3	7.0	4.9	3.1
	1891	6.3	27.9		12.7		3.4
		15 to 24:					
	1901	50.2					
	1891	49.7					
Ireland		*Under 15:*	*20 to 25:*	*25 to 45:*	*45 to 64:*		*65 and over:*
	1901	2.4	19.4	31.6	20.7		7.9
	1891	3.4	17.0	27.3	19.3		7.5
		15 to 19:					
	1901	18.0					
	1891	25.5					
United States		*10 to 24:*	*25 to 44:*		*45 to 64:*		*65 and over:*
	1900	49.3	34.7		13.1		2.9
	1890*f*						
		10 to 15:		*16 to 59:*			*60 and over:*
	1880	11.1		86.2			2.7

a Without domestic servants, whose age classification in 1890 is not given. Numbers for 1900 in parentheses include domestic servants.
b Age classification of working women not contained in official publications.
c Without domestic servants, who are considered by the Swiss occupational statistics as belonging to their employers' occupations.
d Age classification carried out for a few main occupations only in 1891 and 1901, not for whole female working population.
e Age classification not contained in official publications in 1890 and 1900.
f Age classification of the working population in 1890 not published in the Federal statistics.

V. *Marital condition of working women.*

County.	Year.	Single.		Married.		Widowed and divorced.		Other.		Total.	
		Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Germany	1907	5,642,086	59.4	2,817,909	29.7	1,032,886	10.9			9,492,881	100
	1895	4,545,766	69.1	1,057,653	16.1	974,931	14.8			6,578,350	100
	1882	[a] 4,827,457	[a] 87.1	714,060	12.9					5,541,517	100
Austria	1900	2,818,594	44.7	2,613,259	41.4	874,858	13.9			6,306,711	100
	1890	2,917,477	46.7	2,460,459	39.4	867,137	13.9			6,245,073	100
Hungary	1900	1,087,877	40.8	1,062,372	39.8	518,232	19.4			[b] 2,668,481	100
	1890[c]										
Switzerland	1900	269,881	65.1	[d] 144,573	34.9					[e] 414,454	100
	1888[c]										
France	1906	2,699,433	35.1	4,015,454	52.2	918,212	11.9	60,323	0.8	7,693,412	100
	1901	2,698,193	39.7	3,142,744	46.2	893,401	13.1	70,172	1.0	6,804,510	100
	1896	2,520,403	39.5	2,783,790	43.6	796,366	12.5	282,099	4.4	[b] 6,382,658	100
Italy	1901[c]										
	1881[c]										
Belgium	1900[c]										
	1890[c]										
Netherlands [f]	1899	335,626	77.4	97,773	22.6					433,399	100
	1889	264,434	74.9	88,625	25.1					353,059	100
Denmark	1901	308,587	71.7	25,678	6.0	95,934	22.3			430,199	100
	1890[c]										
Sweden	1900[c]										
	1890[c]										
Norway	1900	319,346	41.5	360,112	46.8	88,807	11.6	1,029	0.1	[b] 769,294	100
	1891[g]	(280,112)	(40.7)	(326,083)	(47.4)	(80,996)	(11.8)	(884)	(0.1)	(688,075)	100
England and Wales	1901	3,254,242	78.0	[d] 917,509	[d] 22.0					4,171,751	(100)
	1891[c]										
Scotland	1901[c]										
	1891[c]										
Ireland	1901[c]										
	1891[c]										
United States	1900	[h] 3,309,665	66.1	775,924	15.5	921,480	18.4			[i] 5,007,069	100
	1890	[h] 2,531,548	68.2	515,124	13.9	665,472	17.9			[i] 3,712,144	100
	1880[c]										

[a] Widowed and divorced working women included.
[b] The slight difference from the number of working women contained in Table I is not to be explained in view of the sources.
[c] Classification of working women according to marital condition not published.
[d] Includes married and widowed.
[e] Without servants, who are not classified according to marital condition.
[f] Only classified as married and single.
[g] Cf. note 1 of Table II.
[h] Working women of 15 years and over.
[i] Including those of unknown marital condition.

ON THE ESTABLISHMENT OF A SERIES OF FORMS OF DEATH RATES FOR VARIOUS DISEASES.

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GENERAL.

A series of statistical results for any subject and for a particular group of people or "community," when arranged for successive years, shows the progress therein of the community in respect of the subject in question. This it does either absolutely or as rates, according as the results are expressed in absolute numbers or, as is ordinarily preferable, in rates. Thus, for example, if death rates be expressed as the number dying per 1,000 of the community, the progress is shown independently of its mere magnitude, and thus directly affords a basis of comparison with similar rates for other communities. This basis is, however, an imperfect one unless the communities are identically constituted with respect to age and sex. It is evident that if all communities were identically constituted, the crude rates of mortality just referred to would be a sufficient general indication of the relative position of each community (or nation) in respect either of general mortality or of mortality due to any particular disease, according as the results indicated the one or the other. Attempts have been made to overcome the difficulty indicated by computing a so-called "index of mortality;" that is, by computing what the mortality would have been had the constitution of the population been that of Sweden for the year 1890, with the mortality actually ascertained for the several age groups.[1]

In perfectly just comparisons the differences of constitution according to both sex and age must be taken into account. At present, however, we concern ourselves not with this aspect of the question, but with another larger question, viz, the comparative place which any particular community holds in a large group of communities of which it is regarded a member.

In considering the results for a group of communities it may initially be observed that by enlarging the number grouped the averages will tend to show smaller fluctuations than would characterize smaller groups; that is, the change from year to year will tend to become more gradual. This is due to the fact that such large averages are, to a considerable extent, free from what may be called merely accidental or local deviations from the general result, viz, the result which reflects the characteristics of the whole of the groups

combined considered as a totality. In practice it is often convenient to deduce this general result from the rates for individual communities already given. This can readily be done by merely weighting the rates furnished for various countries directly according to their populations, and for the purpose of practical calculations but few figures are really required. Thus, suppose the populations of a series of countries are P_1, P_2, P_3, etc., and the rates of mortality for any disease (or group of diseases) are m_1, m_2, m_3, etc., then we have for the general rate m_o; for the whole group $P_1+P_2+P_3$, etc.,

$$(1) \qquad m_o=\frac{m_1 P_1+m_2 P_2+m_3 P_3+\text{etc.}}{P_1+P_2+P_3+\text{etc.}}=\frac{\Sigma(mP)}{\Sigma P.}$$

In general, the values of P need only be approximate.

The weighted mean so obtained may be called the "normal rate," or more briefly the "norm," for the group consisting of all the communities included in the general result.

As a basis of comparison this norm is obviously of great value; for general purposes probably of higher value than any other basis that can be suggested, since it represents the characteristic of the total group of which each community to be compared forms a part.

The principle indicated is obviously of wide application, and it would be of considerable advantage to statistics generally if norms were established for all important statistical elements. It is in the study of such norms that world-wide effects can be ascertained, since, as stated, the merely local phenomena tend to disappear in the averages derived from large aggregates, and, moreover, it is the appropriate basis for all comparisons.

I propose in the following paper to tentatively establish norms for several of the more important causes of mortality.

COMPARISONS OF INDIVIDUAL RESULTS WITH A NORM.

When a norm has been ascertained for any large group of communities, then the relative position of any member may be best indicated in the following way, viz, by dividing the rate for the group, multiplied, say, by 100 (or 1,000, etc.), by the norm rate. For all practical purposes the results will then be sufficiently accurate if cast merely to the nearest unit. Thus m_k/m_o is the comparative place of the kth group in relation to the whole, but to avoid the use of a decimal it is better to tabulate the value of 100 m_k/m_o or 1000 m_k/m_o instead of the former.

In this way the norms for infantile mortality and for certain diseases have been tentatively established for the epoch indicated in the tabulations. The diseases are: (*a*) Measles; (*b*) diphtheria and croup; (*c*) whooping cough; (*d*) enteric fever; (*e*) pulmonary tuberculosis; (*f*) cancer; and (*g*) scarlet fever. The norm for mortality (*h*) from all causes has also been given and also for (*i*) infantile mortality.

EPOCH CORRESPONDING TO A NORM.

In many cases it is impracticable to obtain results for identical periods. Although not quite satisfactory, it is then often desirable to include available periods differing as little as possible from those to hand. If results were all furnished for the one period, say, 1912, for example, the epoch of reference is the middle of the year, and this is most conveniently denoted by 1912.5. Thus 1912.0 will denote the instant of commencement of the year. When different periods are included, then, in determining the mean epoch, each should be weighted accordingly to the population to which it refers. Thus in the formula (1) already indicated, m may denote date year instead of mortality rate and 0.5 must be added to the result for the determination of the epoch.

THE NORM FOR INFANTILE MORTALITY.

In the following table are given the data for the evaluation of the norm of infantile mortality and the position of each country in regard thereto:

Rates of infantile mortality.

[Number of deaths under 1 year of age per 1,000 births.]

Country.	Year 1900+	Births, unit 1,000.	Rate of infantile mortality.	Per cent on norm.	Country.	Year 1900+	Births, unit 1,000.	Rate of infantile mortality.	Per cent on norm.
Austria	7	942	204	127	Scotland	9	129	108	68
Belgium	8	184	147	90	Servia	8	104	158	99
Bulgaria	8	169	170	106	Sweden	8	139	85	53
Denmark	8	76	123	77	Switzerland	8	96	108	68
England and Wales	9	915	109	68	Ceylon	9	149	202	126
Finland	9	95	111	69	Japan	8	1,673	157	98
France	7	774	135	84	Chile	8	130	320	200
Hungary	9	776	212	133	Jamaica	9	34	174	109
Ireland	9	103	92	58	Ontario	8	55	124	78
Italy	8	1,139	153	96	New Zealand	9	27	62	39
Netherlands	9	171	99	62	Commonwealth of Australia	9	114	72	45
Norway	8	61	76	48					
German Empire	8	2,015	178	111					

Total births, 1,007,000; epoch, about 1908.6; norm 160.0 per 1,000 births.

The final column, viz, "Percentages on norm," shows the relative frequency of infantile mortality in the various countries shown—that is, the most unfavorable position belongs to Chile, next to Hungary, then Austria and Ceylon, the German Empire, Jamaica, Bulgaria, Servia, and so on. The most favorable place is New Zealand, and next the Australian Commonwealth, the two being roughly about two-fifths the normal rate. Chile is double the normal rate.

NORMS FOR VARIOUS DISEASES AND FOR THE GENERAL DEATH RATE.

The statistics available for the countries shown in the table hereunder are used to tentatively establish the norms for the diseases shown. They form the indications for about 270,000,000 people, viz,

for a little more than, say, one-seventh of the earth's population. The table, less extensive that that for infantile mortality, shows again that individual results often differ very widely from the mean, the divergencies ranging between 4 per cent and over 900 per cent.

Death rates and norms for various diseases, 1908–9.

Country.	Year 1900+	Population (millions).	Number dying per annum per 1,000 inhabitants.							
			Measles.		Diphtheria and croup.		Whooping cough.		Enteric fever.	
			Rate.	Per cent on norm.	Rate.	Per cent on norm.	Rate.	Per cent on norm.	Rate.	Per cent on norm.
Austria	8	28.1	0.28	117	0.28	127	0.32	139	0.15	88
Belgium	8	7.5	.40	167	.17	77	.36	157	.11	65
England and Wales	9	35.8	.35	146	a.15	68	.20	87	.06	35
Hungary	9	21.0	.39	163	.44	200	.34	148	.30	176
Ireland	9	4.4	.10	42	a.09	41	.27	117	.07	42
Italy	9	34.4	.32	133	.17	77	.15	65	.28	165
Netherlands	9	5.9	.17	71	a.06	27	.17	74	.05	29
Roumania	9	6.9	.10	42	.05	23	.16	70	.29	171
Scotland	9	4.9	.19	79	.20	91	.47	204	.06	35
Servia	8	2.8	.....	.....	.32	145	2.08	904	.13	76
Spain	9	19.9	.39	163	.21	95	.18	78	.27	159
Switzerland	8	3.5	.06	25	.16	73	.14	61	.04	24
Prussia	9	39.3	.17	71	.25	114	.25	109	.05	29
United States (registration area, 8 States)	9	48.8	.10	42	.21	95	.10	43	.22	129
Ontario (Province of)	8	2.3	.02	8	.20	91	.11	48	.30	176
New Zealand	9	1.0	.03	13	a.07	32	.04	17	.06	35
Commonwealth of Australia	9	4.3	.01	4	.10	45	.06	26	.15	88
Population (millions)	.....	270.8	268.0	.....	270.8	.....	270.8	.....	270.8	.....
Norm	.....	.....	0.24	.....	0.22	.....	0.23	.....	0.17	.....

Mean, 1908.7. Epoch, about 1909.2=1908.7+0.5.

Country.	Year 1900+	Population (millions).	Pulmonary tuberculosis.		Cancer.		Scarlet fever.		General death rate.	
			Rate.	Per cent on norm.	Rate.	Per cent on norm.	Rate.	Per cent on norm.	Rate.	Per cent. on norm.
Austria	8	28.1	3.02	197	0.72	103	0.53	230	22.3	120
Belgium	8	7.5	1.01	66	.54	77	.16	70	16.5	89
England and Wales	9	35.8	1.08	71	.95	136	.09	39	14.5	78
Hungary	9	21.0	.....	.....	.43	61	.51	222	25.1	135
Ireland	9	4.4	1.84	120	.65	93	.03	13	17.2	92
Italy	9	34.4	b1.22	80	.53	76	.08	35	21.4	114
Netherlands	9	5.9	1.23	80	.90	129	.03	13	13.7	74
Roumania	9	6.9	.....	.....	.....	.....	1.08	470	27.8	149
Scotland	9	4.9	1.28	84	1.02	146	.12	52	15.3	82
Servia	8	2.8	3.12	204	.....	.....	1.41	613	23.7	127
Spain	9	19.9	1.24	81	.44	63	.09	39	23.4	126
Switzerland	8	3.5	1.73	113	1.11	159	.04	17	16.2	87
Prussia	9	39.3	.....	.....	.74	106	.22	96	17.0	91
United States (registration area, 18 States)	9	48.8	1.44	94	.77	110	.12	52	15.0	81
Ontario (Province of)	8	2.3	.....	.....	.61	87	.07	30	13.9	75
New Zealand	9	1.0	.61	40	.82	117	.03	13	9.2	49
Commonwealth of Australia	9	4.3	.73	48	.73	104	.02	9	10.3	55
Population (millions)	.....	270.8	201.3	.....	261.1	.....	270.8	.....	270.8	.....
Norm	.....	.....	1.53	.....	0.70	.....	0.23	.....	18.6	.....

a Including croup. b Pulmonary and general.

Mean, 1908.7. Epoch about 1909.2.

QUINQUENNIAL AND DECENNIAL NORMS.

Owing to the fact that some diseases are epidemic and are therefore subject to enormous fluctuations from year to year, the procedure thus far indicated is not quite satisfactory, and it would no doubt be invariably preferable to form quinquennial, or, better again, decennial norms—that is to say, norms which embrace a period sufficiently long to minimize the effect of years characterized by unusually large or unusually small numbers of deaths. The great differences in the annual death rates for measles, typhoid, diarrhea, whooping cough, etc., disclose the fact that even a quinquennial period is too short to sufficiently minimize the effect of unusually favorable or unfavorable years.

POPULATION NORMS AND MORTALITY COMPARISONS.

It has already been indicated that any comparisons based on total population are necessarily merely of an approximate character and can be rigorously valid only when the constitution of the two populations compared are identical in respect of sex and age. For exhaustive and rigorous comparisons it is necessary to create as a basis a standard constitution or population norm. Instead, however, of taking the constitution of Sweden for a particular year, viz, 1890, it is preferable to form a norm for the constitution of population in exactly an analogous way to that already indicated here for diseases—that is, it is to form a population table according to age groups in which the aggregate male and aggregate female population in age groups is set out.

After this has been done the two series, viz, one for males and one for females, show the normal constitution for the inclusive group, and the variations of each community from these norms may be regarded as its differentiating characteristic in the particular respect under review. This question is dealt with, however, in another paper by the author and Mr. C. H. Wickens.

For reductions of the greatest exactitude it is clearly necessary to treat each sex separately, and for cases in which less exactitude is sufficient the two sexes combined. Then, as in the present "index of mortality" method, the mortality which actually occurred in any age group is multiplied into the figure showing the standard distribution in respect of that group; the product is the mortality index, which gives a basis of comparison from which the effect of age and sex has been to a large extent eliminated, as is at once obvious from the mode of computing it. Thus, let P_1, P_2, P_3, etc., be the numbers in, say, 1,000 (or 1,000,000, or any convenient number) in the successive age groups of the standard population or norm, so that $\Sigma P = 1{,}000$, or 1,000,000, etc., as the case may be. Then, if m_1, m_2, m_3, etc., be the corresponding death rates in the same groups for any particular population, the "index of mortality" is $\Sigma(mP)/\Sigma P$.

VARIATION OF NORMS.

The development of medicine and of hygiene has been followed by an extensive and considerable diminution of the death rate generally, and by a remarkable diminution of certain death rates—for example, those for pulmonary tuberculosis, typhoid, diarrhea and enteritis, etc., the general death rate (D) in Australia, expressed per 1,000 per annum, being approximately represented by the formula

$$D = 16.2 - 0.185\ (T - 1880) \tag{2}$$

This formula is substantially accurate from 1882 to the present time.

This diminution is not identical for both sexes, however, and does not apply to all diseases, cancer, for example, being on the increase. Experience also shows that for some diseases the rate for "persons" increases or diminishes linearly, while for other diseases the change is not linear, and for others again there is no very definite evidence of change. For example, the number (D_t) per 1,000 of the general population dying annually of pulmonary tuberculosis [2] has been shown by the author [3] to be

$$D_t = 1.37 - 0.022\ (T - 1880) \tag{3}$$

T denoting the year for which the value is required.

The number (D_c) similarly dying from cancer [4] was also found to be

$$D_c = 0.31 + 0.014\ (T - 1880) \tag{4}$$

which indicates that the rates are approximately identical for the year 1910, about, both being about 0.72. (The actual rate was slightly over 0.72 for both diseases in the year 1909.)

It is worthy of mention here that the progression of the two diseases in England and Wales was also found by the author [3] to be

$$D_t = 1.28 - 0.0216t \text{ and } D_c = 0.83 + 0.0132t \tag{5}$$

t denoting $T - 1880$. It is remarkable that both the diminution in the death rate from tuberculosis and the increase in that from cancer in Australia should be sensibly identical with those in England and Wales.

Other diseases, the changes of which have been studied, give the following results as the general trend for Australia, viz:

(6) Measles: $D = 75 - 0.7t$ (very irregular).

(7) Scarlet fever: $D = 74 - 2.1t$ (irregular).

(8) Diphtheria and croup: $D = 390 - 91.4t + 36.108t^2 - 3.363t^3 + 0.0877t^4$ (irregular); from 1885 only.

(9) Diarrhea and dysentery: $D = 610 + 165t - 313t^{\frac{5}{6}}$.

(10) Typhoid: $D = 660 - 29t + 0.39t^2$ (irregular).

(11) Whooping cough: $D = 180 - 2.6t$ (very irregular).

All these results (equations 6 to 11) are rates per million of "persons," and disclose the fact that the norm for some diseases is probably a rapidly changing quantity.

When norms are constituted for each sex it will be found that in general each has its own rate of progression. For example, in general mortality in Australia the masculinity has advanced between 1880 and 1910 almost linearly. If we put M for the number of males dying per 1,000 females, the number of each sex being supposed equal in the general population, this progression of masculinity may be expressed up to the present time very approximately by the formula

(12) $$M=1{,}205+1.7t$$

and represents for Australia the probability of the death of a male, that of a female being 1,000, t, as before, denoting the date year less 1880. The progressions for several diseases have been shown by the author to be quite definite in respect of their change in masculinity, and thus the relative probability of the death of males from a particular disease or all diseases as compared with females may be expressed with considerable precision as a function of time.

For example, diseases the masculinity of which are found to vary with elapsed time are as hereunder.

For pulmonary tuberculosis the rate of mortality per 1,000 of population in Australia was found to be

(13) Males: $T_m=1.57-0.026t$

(14) Females: $T_f=1.15-0.017t$

Hence the masculinity expressed (males per 1,000 females) is:

(15) $$M_t=\frac{1365-22.6t}{1-0.0148t}$$

in which t denotes the years after 1880.

For cancer the mortality results are:

For males: $C_m=0.32+0.014t$

For females: $C_f=0.31+0.014t$

Hence in this case the masculinity (males per 1,000 females) is:

(16) $$M_c=\frac{1032+45.2t}{1+0.0452t}$$

Other instances are:

(17) Scarlet fever: $M=814-14t+\frac{4}{3}t^2$

(18) Measles:[a] $M=837+6t$

(19) Whooping cough: $M=593+7.3t$

(20) Diphtheria and croup:[a] $M=876+3t$

(21) Typhoid: $M=951+21.5t$

(22) Diarrhea, etc.:[a] $M=1072+4t$

[a] Results somewhat irregular.

It is clear from the above that the norms for each sex vary with the effluxion of time. We see also, from considering the general trend of diseases already referred to, that the norm for "persons" must likewise vary, and if only it were possible to have the general trend determined of all diseases, as regards each sex, the general trend of the norm could be deduced.

DATA ESSENTIAL FOR ACCURATE COMPARISONS.

Every cause of death has apparently a characteristic frequency according to age. For example, for Australia the probability of death from pulmonary tuberculosis after 5 years of age continually increases till about the age of 48, after which it declines. In the case of cancer, however, after the age 11 the risk increases continually and very rapidly till the end of life. In tuberculosis also the risk is by no means the same for females as males, high risk occurring earlier with the former than the latter. Hence differences of constitution according to sex and age materially affect the mortality of the total population, and consequently not only the relative numbers in each age group require to be taken into account, but also the masculinity of each age group, or what is the same thing the relative numbers of males M and females F. The most convenient expression for this is the ratio $\mu=(M-F)/(M+F)$, not M/F, the ratio commonly used. Thus for complete data we need the age constitution of the population norm and the values of μ for each age group; and similarly for the individual population. That is, we require P_1, P_2, P_3, etc., μ_1, μ_2, μ_3, etc., for the whole group of populations, and we require also the values of for the one to be compared. These being to hand the death rate for each age group can be corrected to agree with the masculinity of the norm, and this correction will, in general, not be identical for different age groups. For the purpose of the correction for masculinity we should adopt, if possible, that found for the individual population to be compared; if not, that obtained for the entire group.

CORRECTIONS TO APPLY TO INDIVIDUAL RESULTS.

Although when norms have been formed showing the constitution of a large group of populations, and the causes of death by which they are characterized, the data exist by means of which any individual population and the phenomena of mortality characteristic thereof can be compared; this is, after all, only the first step in the direction of utilizing the statistics of mortality. An exhaustive survey or analysis should lead to an appreciation of the reason why any particular age group shows a high rate of mortality. The norm for any cause of death gives the necessary basis for judging whether a community is in a specially favorable or unfavorable position. The

distribution of the deaths according to age affords some guidance in considering whether any remedial measures are desirable. In short, the method of norms furnishes to statistics great and valuable analytic powers.

CONCLUSION.

It will be seen from the foregoing that just as changes in longevity can be followed thoroughly only by comparisons of the age groups of individual communities with the age groups of the large population group to which they may be regarded as belonging, so also the significance of diseases and general mortality can be adequately understood only by comparisons with norms. And this applies also to the progress of death by all diseases, and moreover to the study of any epidemiological characteristics diseases may exhibit. Briefly the construction of norms may be said to present the following advantages, viz:

(1) It elucidates the comparative progress of each people in respect of: (*a*) General mortality; (*b*) infant mortality; (*c*) mortality in each age group; (*d*) characteristics of the incidence of death by each disease for all ages; and (*e*) for each age group.

(2) It affords a basis for the measurement of the fluctuation of each disease.

(3) It indicates the local and wider periodicity of particular diseases.

(4) It enables causes of death to be studied in their universality, thus more clearly defining the characteristics of individual countries.

(5) It will probably facilitate the prediction of the course of disease.

In closing it is suggested that probably decennial norms might be internationally adopted for comparative studies of the incidence of disease among the different nations.

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[1] The groups are: Under 1 year, 1 and under 20, 20 and under 40, 40 and under 60, 60 and upward. See Commonwealth Yearbook, Australia, No. 5, pp. 198, 199.

[2] Includes tubercular bronchopneumonia, plastic bronchitis, consumption, pulmonary consumption, phthisis, fibroid phthisis, and pulmonary phthisis, phthisis, pulmonary and laryngeal, tubercular pleurisy, tubercular pneumonia, tuberculosis (unqualified), and tuberculosis under the following heads, viz: Acute, capillary, miliary, acute miliary, miliary and laryngeal, miliary and renal, pleural and meningeal, pulmonary, pulmonary and abdominal, pulmonary and arthritic, pulmonary and cerebral, pulmonary and gastric, pulmonary and dermal, pulmonary and intestinal, pulmonary and general, pulmonary and laryngeal, pulmonary and glandular, pulmonary and meningeal, pulmonary and pleural, pulmonary and renal, pulmonary and spinal, pulmonary and sacral.

[3] See a paper read before the Australasian Medical Congress of September, 1911, and published in its Transactions.

[4] Includes cancer, epithelioma, carcinoma, malignant tumors and diseases, neoplasm, sarcoma, rodent ulcer, and scirrhus.

THE DETERMINATION AND USES OF POPULATION NORMS REPRESENTING THE CONSTITUTION OF POPULATIONS ACCORDING TO AGE AND SEX, AND ALSO ACCORDING TO AGE ONLY.

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INTRODUCTORY.

In the following paper three things are proposed, viz:

(*a*) To deduce tentatively for persons of European race a population norm representing the constitution of population according to sex and age.

(*b*) To indicate the difference between such constitution and that of colored races.

(*c*) To discuss the methods of deducing rates of mortality in a form suitable for comparative purposes, and especially the application thereto of population norms.

POPULATION NORM REPRESENTING EUROPEAN RACES.

In speaking of a population norm representing European races it must be understood that the term "European races" is used somewhat loosely, since many of the populations which must be included in the computation of such a norm contain elements which are non-European. In the populations selected, however, the European element very largely preponderates, and owing to the selection comprising both old and new countries a fair allowance has been made for the effects due to migration which are noticeable when either an old or a new community is alone under consideration. The populations used on the present occasion are those of England and Wales, Scotland, Ireland, Germany, Italy, Sweden, and Norway, representing the Old World, and those of the United States, Canada, Newfoundland, and Australia, representing what may be termed "new communities." The figures used are those for the censuses of 1900 and 1901, except in the case of Norway, where 1891 figures were employed, and Sweden, where 1895 results were included, later figures for these two countries not being readily available at the moment of writing. Moreover, in the Norway results the 10-year groups had to be distributed. This was done on the basis of the results for the German Empire. In the case of Sweden the results given for ages 0 to 4 and from 80 upward were subdivided into the periods 0, 1–4, and 80–84, etc., also on the basis of the German experience. The New-

foundland group from 80 upward was subdivided on the basis of the Canadian experience. It is proposed at a later date to construct a similar norm on a wider basis when the results of the 1910 and 1911 censuses are fully available, and the collection of data for this purpose is at present in hand. The population norm so prepared may be regarded as a basis by means of which the variations in distribution of the component populations may be compared, and may also be employed for the same purpose in the case of other populations possessing similar characteristics. The norm is really equivalent to the weighted average of the constituent populations which have been aggregated; and consequently the deviation of each constituent from the norm is the best index to be had of any peculiarity inherent in such constituent population. Moreover, since it represents the constitution of a very large and geographically widely distributed aggregate, so selected as to neutralize to a large extent irregularities due to migration, its secular changes will in general be much slower and less marked than those of the constituent populations. A comparison of the trend in the constitution of any constituent population with such a norm is of the highest value in a thorough study of population changes.

METHOD OF COMPUTATION AND PRESENTATION.

Let $P_a, P_b, \ldots\ldots P_n$ denote the n populations aggregated, of which the numbers in the successive quinquennial age groups are ${}_aL^{\circ}_4, {}_aL^5_9 \ldots\ldots$; ${}_bL^{\circ}_4, {}_bL^5_9 \ldots\ldots$; etc.[1] Then since $\sum_{x=0}^{x=\omega-4} L^x_{x+4} = P$, we have for the ratio of the number in each age group to the total $r^{\circ}_4 = L^{\circ}_4/P$, $r^5_9 = L^5_9/P$, $\ldots\ldots$, etc., with the suffixes corresponding to the respective populations.

The norm is given by $R^{\circ}_4 = \sum_{x=a}^{x=n} {}_xL^{\circ}_4 \Big/ \sum_{x=a}^{x=n} P_x$; $R^5_9 = \sum_{x=a}^{x=n} {}_xL^5_9 \Big/ \sum_{x=a}^{x=n} P_x$, etc., which are equivalent to $R^{\circ}_4 = \sum_{x=a}^{x=n} (P_x \cdot {}_xr^{\circ}_4) \Big/ \sum_{x=a}^{x=n} P_x$, etc.

In order to have whole numbers to deal with, it is usually desirable in practice to tabulate not r and R but 1,000 r, 10,000 r, 100,000 r, etc., and 1,000 R, 10,000 R, 100,000 R, etc., according to the extent of detail required. (See the tables hereinafter.)

CONSTITUTION OF POPULATIONS OF EUROPEAN RACE.

The following tables, I to III, furnish for each sex, and for persons, results computed according to the above formulæ for each of the countries mentioned in paragraph 2, whilst the distribution of the entire population is shown in the last line of each of the tables.

AGE DISTRIBUTION PER 10,000 OF POPULATIONS MAINLY OF EUROPEAN RACE, ACCORDING TO CENSUSES OF 1900 AND 1901.

TABLE I.—*Males.*

Country.	Population.	Age groups.																					
		0	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 ta 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 and over.	Total.
United States (1900)	38,816,448	250	947	1,158	1,055	969	937	859	750	676	583	475	404	296	237	173	116	68	32	11	3	1	10,000
Scotland	2,173,755	267	968	1,147	1,096	1,060	968	834	694	610	546	462	385	302	256	170	121	68	33	10	2	1	10,000
Germany (1900)	27,737,247	297	1,036	1,156	1,055	961	916	802	707	616	545	454	398	342	273	196	129	76	32	8	1	.....	10,000
Norway (1891)	966,566	313	1,091	1,217	1,101	1,003	727	637	614	535	509	424	408	350	379	273	208	123	64	16	7	1	10,000
England and Wales	16,005,810	257	918	1,080	1,036	1,023	975	869	762	659	565	470	406	325	243	177	121	71	32	9	2	.....	10,000
Sweden (1895)	2,389,211	273	954	1,140	1,069	983	790	643	646	589	520	468	443	386	361	286	233	132	65	17	2	....	10,000
Italy	16,138,895	298	1,003	1,124	1,062	926	810	664	617	590	555	503	472	413	348	259	186	109	47	12	2	.....	10,000
Ireland	2,200,040	200	822	1,038	1,065	1,068	988	795	664	530	532	409	475	322	447	227	210	96	78	22	9	3	10,000
Canada	2,751,708	244	947	1,143	1,086	1,030	944	795	691	634	558	462	390	302	267	200	144	90	48	18	5	2	10,000
Australia	1,977,928	240	877	1,173	1,109	963	886	824	793	771	639	450	341	267	234	196	131	64	31	8	2	1	10,000
Newfoundland	111,311	344	1,131	1,248	1,143	1,061	909	761	570	555	488	448	369	323	236	170	116	74	36	13	4	1	10,000
Distribution of entire male population (normal)	111,268,919	270	971	1,139	1,057	975	915	808	715	640	563	470	413	331	272	197	136	79	36	10	3	1	10,000

AGE DISTRIBUTION PER 10,000 OF POPULATIONS MAINLY OF EUROPEAN RACE, ACCORDING TO CENSUSES OF 1900 AND 1901—Continued.

TABLE II.—*Females.*

Country.	Population.	Age groups.																					
		0	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 ta 74	75 to 79	80 ta 84	85 to 89	90 to 94	95 and over.	Total.
United States (1900)	37,178,127	255	967	1,184	1,077	1,026	1,000	864	715	633	537	436	371	287	236	171	117	70	35	13	4	2	10,000
Scotland	2,298,348	247	905	1,059	1,005	982	970	860	715	632	551	471	404	336	305	217	164	98	55	18	5	1	10,000
Germany (1900)	28,629,931	282	1,000	1,118	1,017	927	894	784	695	608	551	470	433	378	311	229	156	94	40	11	2	.....	10,000
Norway (1891)	1,037,536	276	976	1,090	1,009	919	819	714	674	590	534	455	419	366	391	288	228	137	81	23	10	1	10,000
England and Wales	16,799,230	243	878	1,033	989	1,000	956	879	770	662	567	479	418	345	271	208	148	92	44	15	3	.....	10,000
Sweden (1895)	2,530,049	248	880	1,048	983	899	753	644	669	630	548	510	479	428	399	342	280	158	76	21	4	1	10,000
Italy	16,308,579	283	953	1,074	1,027	934	821	696	647	603	569	508	490	414	362	261	188	106	48	12	3	1	10,000
Ireland	2,258,735	187	777	985	998	1,053	1,004	831	655	543	559	435	535	340	466	209	210	89	87	21	11	5	10,000
Canada	2,619,607	251	975	1,172	1,095	1,047	968	796	673	610	530	437	376	302	262	197	144	89	49	19	6	2	10,000
Australia	1,795,873	257	941	1,259	1,198	1,051	985	874	759	672	531	367	293	240	207	170	103	54	28	9	2	.....	10,000
Newfoundland	105,726	337	1,145	1,275	1,106	1,057	930	757	568	562	497	431	367	304	233	173	124	76	37	15	4	2	10,000
Distribution of entire female population (normal)	111,561,741	263	953	1,119	1,038	980	931	813	705	624	550	463	417	344	290	212	150	88	43	13	3	1	10,000

AGE DISTRIBUTION PER 10,000 OF POPULATIONS MAINLY OF EUROPEAN RACE, ACCORDING TO CENSUSES OF 1900 AND 1901—Continued.

TABLE III.—*Males and females.*

Country.	Population.	Age groups.																					
		0	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 and over.	Total.
United States (1900)	75,994,575	253	957	1,171	1,066	997	968	861	733	655	560	456	388	292	236	172	117	69	33	12	3	1	10,000
Scotland	4,472,103	256	936	1,102	1,050	1,020	969	847	705	621	549	467	395	319	281	194	143	83	44	14	4	1	10,000
Germany (1900)	56,367,178	289	1,018	1,136	1,036	944	905	793	701	612	548	462	416	360	292	213	142	85	36	10	2	.....	10,000
Norway (1891)	2,004,102	293	1,031	1,151	1,054	960	775	677	645	563	522	440	414	358	385	281	218	130	73	20	9	1	10,000
England and Wales	32,805,040	250	897	1,056	1,012	1,011	966	874	766	661	566	474	412	335	258	193	135	82	38	12	2	.....	10,000
Sweden (1895)	4,919,260	260	916	1,091	1,025	940	771	644	658	610	534	490	461	408	381	315	257	146	71	19	3	.....	10,000
Italy	32,447,474	291	978	1,099	1,044	930	816	680	632	597	562	505	481	413	355	260	187	107	47	12	3	1	10,000
Ireland	4,458,775	194	800	1,011	1,031	1,060	996	813	660	537	546	422	505	331	457	218	210	92	82	21	10	4	10,000
Canada	5,371,315	247	961	1,157	1,090	1,038	956	796	682	622	545	449	383	302	265	199	143	90	49	18	6	2	10,000
Australia	3,773,801	248	908	1,214	1,151	1,005	933	848	777	724	588	410	318	254	221	183	118	59	29	9	2	1	10,000
Newfoundland	217,037	341	1,138	1,261	1,125	1,059	919	759	569	558	492	440	368	314	235	172	120	74	37	14	4	1	10,000
Distribution of entire population (normal)	222,830,660	266	962	1,129	1,047	977	923	810	710	632	557	467	415	337	281	205	143	84	39	12	3	1	10,000

In Table I the distribution according to age for males is given, in Table II that for females, and in Table III for males and females combined.

POPULATION AT AND ABOVE A GIVEN AGE.

For many purposes in connection with demographic statistics it is useful to have the data arranged so as to show the numbers or proportions of population at and above given ages. For example, in connection with questions relative to old-age pensions the proportions at and above pension age, whether 60, 65, or 70, are of importance. These are, of course, ascertainable from Tables I to III, but to obtain them a series of items must be added in each case. Further, where proportions between specified ages are required, as, for example, the proportions between the ages of 15 and 65 in males, the so-called supporting age, the subtraction of the proportion at and above 15 from the proportion at and above 65 gives the result at once. Similarly the proportion of women between the ages of 15 and 45, the so-called reproductive age, can be readily ascertained by subtraction. In addition this arrangement of the data has other advantages which are dealt with later. Tables IV, V, and VI give in this form the information which has already been shown in age groups in Tables I, II, and III.

TABLE IV.—*Number per 10,000 of male population at and above certain ages (censuses of 1900 and 1901).*

Country.	Number at and above age.																				
	0	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
United States (1900)	10,000	9,750	8,803	7,645	6,590	5,621	4,684	3,825	3,075	2,399	1,816	1,341	937	641	404	231	115	47	15	4	1
Scotland	10,000	9,733	8,765	7,618	6,522	5,462	4,494	3,660	2,966	2,356	1,810	1,348	963	661	405	235	114	46	13	3	1
Germany (1900)	10,000	9,703	8,667	7,511	6,456	5,495	4,579	3,777	3,070	2,454	1,909	1,455	1,057	715	442	246	117	41	9	1	....
Norway (1891)	10,000	9,687	8,596	7,379	6,278	5,275	4,548	3,911	3,297	2,762	2,253	1,829	1,421	1,071	692	419	211	88	24	8	1
England and Wales	10,000	9,743	8,825	7,745	6,709	5,686	4,711	3,842	3,080	2,421	1,856	1,386	980	655	412	235	114	43	11	2	....
Sweden (1895)	10,000	9,727	8,773	7,633	6,564	5,581	4,791	4,148	3,502	2,913	2,393	1,925	1,482	1,096	735	449	216	84	19	2	....
Italy	10,000	9,702	8,699	7,575	6,513	5,587	4,777	4,113	3,496	2,906	2,351	1,848	1,376	963	615	356	170	61	14	2	....
Ireland	10,000	9,800	8,978	7,940	6,875	5,807	4,819	4,024	3,360	2,830	2,298	1,889	1,414	1,092	645	418	208	112	34	12	3
Canada	10,000	9,756	8,809	7,666	6,580	5,550	4,606	3,811	3,120	2,486	1,928	1,466	1,076	774	507	307	163	73	25	7	2
Australia	10,000	9,760	8,883	7,710	6,601	5,638	4,752	3,928	3,135	2,364	1,725	1,275	934	667	433	237	106	42	11	3	1
Newfoundland	10,000	9,656	8,525	7,277	6,134	5,073	4,164	3,403	2,833	2,278	1,790	1,342	973	650	414	244	128	54	18	5	1
Distribution of entire male population (normal)	10,000	9,730	8,759	7,620	6,563	5,588	4,673	3,865	3,150	2,510	1,947	1,477	1,064	733	461	264	128	49	13	3	1

TABLE V.—*Number per 10,000 of female population at and above certain ages (censuses of 1900 and 1901).*

Country.	Number at and above age.																				
	0	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
United States (1900)	0,000	9,745	8,778	7,594	6,517	5,491	4,491	3,627	2,912	2,279	1,742	1,306	935	648	412	241	124	54	19	6	2
Scotland	10,000	9,753	8,848	7,789	6,784	5,802	4,832	3,972	3,257	2,625	2,074	1,603	1,199	863	558	341	177	79	24	6	1
Germany (1900)	10,000	9,718	8,718	7,600	6,583	5,656	4,762	3,978	3,283	2,675	2,124	1,654	1,221	843	532	303	147	53	13	2	....
Norway (1891)	10,000	9,724	8,748	7,658	6,649	5,730	4,911	4,197	3,523	2,933	2,399	1,944	1,525	1,159	768	480	252	115	34	11	1
England and Wales	10,000	9,757	8,879	7,846	6,857	5,857	4,901	4,022	3,252	2,590	2,023	1,544	1,126	781	510	302	154	62	18	3	....
Sweden (1895)	10,000	9,752	8,872	7,824	6,841	5,942	5,189	4,545	3,876	3,246	2,698	2,188	1,709	1,281	882	540	260	102	26	5	1
Italy	10,000	9,717	8,764	7,690	6,663	5,729	4,708	4,212	3,565	2,962	2,393	1,885	1,395	981	619	358	170	64	16	4	1
Ireland	10,000	9,813	9,036	8,051	7,053	6,000	4,996	4,165	3,510	2,967	2,408	1,973	1,438	1,098	632	423	213	124	37	16	5
Canada	10,000	9,749	8,774	7,602	6,507	5,460	4,492	3,696	3,023	2,413	1,883	1,446	1,070	768	506	309	165	76	27	8	2
Australia	10,000	9,743	8,802	7,543	6,345	5,294	4,309	3,435	2,676	2,004	1,473	1,106	813	573	366	196	93	39	11	2	....
Newfoundland	10,000	9,663	8,518	7,243	6,137	5,080	4,150	3,393	2,825	2,263	1,766	1,335	968	664	431	258	134	58	21	6	2
Distribution of entire female population (normal)	10,000	9,737	8,784	7,665	6,627	5,647	4,716	3,903	3,198	2,574	2,024	1,561	1,144	800	510	298	148	60	17	4	1

TABLE VI.—*Number per 10,000 of total population at and above certain ages (censuses of 1900 and 1901).*

Country.	Number at and above age.																				
	0	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
United States (1900)	10,000	9,747	8,790	7,619	6,553	5,556	4,588	3,727	2,994	2,339	1,779	1,323	935	643	407	235	118	49	16	4	1
Scotland	10,000	9,744	8,808	7,706	6,656	5,636	4,667	3,820	3,115	2,494	1,945	1,478	1,083	764	483	289	146	63	19	5	1
Germany (1900)	10,000	9,711	8,693	7,557	6,521	5,577	4,672	3,879	3,178	2,566	2,018	1,556	1,140	780	488	275	133	48	12	2	....
Norway (1891)	10,000	9,707	8,676	7,525	6,471	5,511	4,736	4,059	3,414	2,851	2,329	1,889	1,475	1,117	732	451	233	103	30	10	1
England and Wales	10,000	9,750	8,853	7,797	6,785	5,774	4,808	3,934	3,168	2,507	1,941	1,467	1,055	720	462	269	134	52	14	2	....
Sweden (1895)	10,000	9,740	8,824	7,733	6,708	5,768	4,997	4,353	3,695	3,085	2,551	2,061	1,600	1,192	811	496	239	93	22	3	....
Italy	10,000	9,709	8,731	7,632	6,588	5,658	4,842	4,162	3,530	2,933	2,371	1,866	1,385	972	617	357	170	63	16	4	1
Ireland	10,000	9,806	9,006	7,995	6,964	5,904	4,908	4,095	3,435	2,898	2,352	1,930	1,425	1,094	637	419	209	117	35	14	4
Canada	10,000	9,753	8,792	7,635	6,545	5,507	4,551	3,755	3,073	2,451	1,906	1,457	1,074	772	507	308	165	75	26	8	2
Australia	10,000	9,752	8,844	7,630	6,479	5,474	4,541	3,693	2,916	2,192	1,604	1,194	876	622	401	218	100	41	12	3	1
Newfoundland	10,000	9,659	8,521	7,260	6,135	5,076	4,157	3,398	2,829	2,271	1,779	1,339	971	657	422	250	130	56	19	5	1
Distribution of entire population (normal)	10,000	9,734	8,772	7,643	6,596	5,619	4,696	3,886	3,176	2,544	1,987	1,520	1,105	768	487	282	139	55	16	4	1

USES OF POPULATION NORMS.

In either of the forms presented above the population norm has numerous demographic uses, of which the two following are of considerable importance, viz:

(*a*) It furnishes a basis for the comparison of the constitution of other populations, and (*b*) it gives a standard by means of which birth, death, marriage, and other rates which are functions of age may be suitably reduced to a common denominator, and thus be readily compared.

The idea of an aggregate population norm is, of course, not new, and at Vienna in 1891 Dr. Ogle proposed the establishment and international use of a "standard population" with a fixed age and sex distribution, and he gave tables showing the aggregate for England and Wales, Austria, Switzerland, Germany, Holland, France, and Italy, the epoch being about 1881.[2] The results differ somewhat, though not markedly, from those shown in the tables here given, but it is believed that the inclusion in the present tables of European races resident in new communities has improved the result. As before noted, a more extensive computation is in progress for which the 1910 and 1911 results are being collected.

COMPARISON OF DIFFERENT CONSTITUTIONS.

While the tables given furnish a ready means of reviewing the positions of any of the countries comprised in respect of the proportions in a given age group or the proportions at and above a given age, the amount of detail renders it somewhat difficult to obtain a very definite conception of the closeness with which any given distribution accords throughout its range with that of the population norm; in other words, we are "unable to see the forest for the trees." What is needed is some means of reliably expressing in a very few numbers the characteristics of the various distributions. One convenient method of doing this is by computing for each sex and for the sexes combined, the aggregate deviation (irrespective of sign) of the given distribution from the norm. For this purpose Tables I, II, and III are the most serviceable. The following table furnishes particulars for each of the countries specified and shows the aggregate (irrespective of sign) of the deviations from the norm, as well as the magnitude of the maximum deviation in each case:

TABLE VII.

Country.	Aggregate of deviations from norm in proportions per 10,000.			Sign and magnitude of maximum deviation.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
United States	380	594	452	+ 51	+ 69	+ 51
Scotland	422	356	274	+ 85	− 60	+ 46
Germany	244	348	260	+ 65	− 53	+ 56
Norway	1,340	838	990	−188	−112	−148
England and Wales	474	512	484	+ 61	− 86	− 73
Sweden	940	1,360	1,130	−165	−178	−166
Italy	940	818	860	−144	−117	−130
Ireland	1,190	1,184	1,150	+175	−176	+176
Canada	326	482	382	+ 55	+ 67	+ 61
Australia	774	1,176	910	+131	+160	+104
Newfoundland	1,040	1,142	1,092	+160	+192	+176

In the light of the results furnished by this table it may be said that Germany, Scotland, and Canada are, in the order named, the countries which accord most closely in the constitution of their populations with that of the population norm and that Ireland, Sweden, and Newfoundland are, in the order named, those which are most divergent.

Another method of comparison which would be more effective in throwing into relief the large divergencies would be that of aggregating for each country the squares of the deviations, but for the present purpose the aggregate of deviations irrespective of sign will suffice.

COMPARISON OF CONSTITUTION BY THE USE OF MEAN AGES.

Another method of comparing readily the constitution of different populations is by the computation for each of the mean age for each sex, or for the sexes in combination. If the relative frequency of the population at the exact age x be denoted by l_x the mean age of the population will evidently be $\int_0^\omega x l_x dx \Big/ \int_0^\omega l_x dx$

In practice the frequency at exact ages is rarely given by the data, and where details for single ages last birthday are obtainable the mean is usually computed on the basis of the following formula:

$$\text{mean age} = \tfrac{1}{2} + \sum_{x=0}^{x=\omega} x L_x \Big/ \sum_{x=0}^{x=\omega} L_x, \text{ where } L_x$$

denotes the number at age x last birthday and the assumption is made that such persons may on the average be regarded as being of the exact age $x+\frac{1}{2}$. Such an assumption would only be warranted if the frequency curve between ages x and $x+1$ were either a straight line parallel to the axis of x, or were a symmetrical curve having a maximum or a minimum corresponding to the point $x+\frac{1}{2}$, conditions which rarely occur in practice. Since in most populations $L_x > L_{x+1}$ for

all values of x, the mean age of the L_x persons aged x last birthday will usually be less than $x+\frac{1}{2}$, and consequently the mean computed by the usual formula will give a mean age slightly in excess of the truth. The expression $\sum_{x=0}^{x=\omega} xL_x \Big/ \sum_{x=0}^{x=\omega} L_x$, however, gives the correct mean age last birthday, the values of L_x being assumed correct. A table showing the number at and above each age furnishes a ready means for computing the average age next birthday, or last birthday. For example, if it were required to determine the mean age next birthday of the population under the age of 5, we may proceed as follows:

Age last birthday, x.	Number aged x last birthday.	Number at and above age x.
0.....	L_0.....	$L_4+L_3+L_2+L_1+L_0$
1.....	L_1.....	$L_4+L_3+L_2+L_1$
2.....	L_2.....	$L_4+L_3+L_2$
3.....	L_3.....	L_4+L_3
4.....	L_4.....	L_4
		$5L_4+4L_3+3L_2+2L_1+L_0$

$$\text{Mean age next birthday} = \frac{5L_4+4L_3+3L_2+2L_1+L_0}{L_4+L_3+L_2+L_1+L_0}$$

Hence with a table showing the number at and above each age, all that is required is to total the numbers from the youngest to the oldest ages and divide by the total population; the result is the correct mean age next birthday, from which a deduction of $\frac{1}{2}$ gives the usual approximation to the mean exact age, while a deduction of 1 gives the mean age last birthday. Where the data are not available in respect of each age, but give number at and above each quinquennial age, as in Table VI, the mean age at next quinquennial point may be obtained by totaling the number given, dividing by the total population, and multiplying the result by 5. An approximation to the mean exact age could then be obtained by subtracting $2\frac{1}{2}$ from the mean at next quinquennial point. For the reasons stated above such a result would overstate the mean, and would usually involve a larger error than a mean based on results for single ages, but in practically all cases the magnitude of the error would be small and in most cases negligible.

This may be shown as follows:

If the normal population be represented approximately by a straight line terminating, say, at age 100, and having the equation $y=200-2x$, a moderate degree of accord with the actual state of affairs will be attained and a ready means will be afforded for estimating approximately the effect of assuming that the mean age next birthday exceeds the mean exact age by $\frac{1}{2}$, and that the mean age at next quin-

quennial point exceeds the mean exact age by $2\frac{1}{2}$. In such a case the mean exact age will be given by the expression

$$\frac{1}{10.000}\int_0^{100}\{x(200-2x)\}dx=\frac{1}{10.000}\left[100x^2-\frac{2x^3}{3}\right]_{x=100}=33.333'$$

In such a case a computation based on the groups for single ages would give as mean age next birthday,

$$\frac{1}{10.000}\sum_{x=0}^{x=100}[x\{200-(2x-1)\}]=33.835$$

Deducting .5 this gives 33.335 as mean exact age as compared with the correct result 33.333′. In this case the error is negligible, being only about .6 of a day.

When groups for quinquennial ages are taken, the mean at next quinquennial point is

$$\frac{1}{10.000}\sum_{x=1}^{x=20}5[5x\{200-5(2x-1)\}]=35.875$$

Deducting 2.5, this gives a mean of 33.375 as compared with 33.333′, the correct result. Here also the error is slight, about half a month, although somewhat larger than in the case of single age groups. It would thus appear that for many practical purposes a mean derived as above from quinquennial results will prove satisfactory. Further, where the object in view is the comparison of the mean ages of different communities with that of the population norm by showing the amount by which such mean ages exceed that of the norm, the error so involved is approximately eliminated, since, being sensibly the same for each population, it practically disappears by the substraction of one mean from another. In the manner indicated, the following table has been prepared from the data in Table VI showing for each sex and for the sexes combined for each of the countries dealt with, the approximate mean exact age and the amount by which such mean age exceeds the corresponding mean for the normal population.

TABLE VIII.

Country.	Approximate mean age in years.			Number of years by which mean age exceeds that of population norm.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
United States	26.597	26.089	26.338	−0.337	−1.252	−0.810
Scotland	26.221	27.917	27.089	− .713	+ .576	− .059
Germany	26.501	27.574	27.048	− .433	+ .233	− .100
Norway	27.532	29.019	28.307	+ .598	+1.678	+1.159
England and Wales	26.857	27.864	27.371	− .077	+ .523	+ .223
Sweden	28.653	30.514	29.616	+1.719	+3.173	+2.468
Italy	28.211	28.690	28.449	+1.277	+1.349	+1.301
Ireland	28.879	29.573	29.221	+1.945	+2.232	+2.073
Canada	26.978	26.614	26.805	+ .044	− .727	− .343
Australia	26.723	25.040	25.921	− .211	−2.301	−1.227
Newfoundland	25.153	25.126	25.138	−1.781	−2.215	−2.010
Population norm	26.934	27.341	27.148	.....	.....	.....

The last column indicates that as regards the mean age of the whole population, the countries most nearly in accord with the norm are, in the order named, Scotland, Germany, and England and Wales, whilst those which differ most widely are, in the order named, Sweden, Ireland, and Newfoundland. Except for slight differences in the arrangement of the countries and the substitution of England and Wales for Canada, this result agrees with the result of the comparison made in section 7 above. It may be noted that in the "old" communities the mean age of the females exceeds the mean age of the males by amounts ranging from 0.479 year in the case of Italy to 1.861 years in the case of Sweden. On the other hand in all the "new" communities the mean age of the males exceeds that of the females by amounts ranging from 0.027 year in the case of Newfoundland to 1.683 in the case of Australia.

POPULATION NORM EXPRESSED AS A FUNCTION OF AGE.

The method of showing the age distribution of a population as the number at and above certain ages, which has been given in Tables IV, V, and VI of section 5, has in some cases the advantage that the series so produced is capable of approximate representation as a function of age by a mathematical formula of the type $k\alpha^{a^x}\beta^{b^x}$. In the present instance it has been found that the norm for persons given in Table VI may with little trouble be represented by such a formula, with a fair degree of closeness. In computing the value of the constants the logarithms of the values in Table VI for ages 0, 20, 40, 60, and 80 were taken, and successively equated to the appropriate values of $\log k + a^x \log \alpha + b^x \log \beta = K + ma^x + nb^x$, where $K = \log k$; $m = \log \alpha$; and $n = \log \beta$.

The general solution of the five simultaneous equations so arising may be given as follows:

Let S denote the initial value of the variable, and t the increment of the variable, so that for five terms the values of the variable will be s, $s+t$, $s+2t$, $s+3t$, and $s+4t$. Let $f(s)$, $f(s+t)$, etc., denote the values of the logarithms of the population at and above the ages s, $s+t$, ———, etc.

Then we have

$$K + ma^{s+vt} + nb^{s+vt} = f(s+vt)$$

where v has in succession the values 0 to 4. Successively differencing these equations the following are obtained:

$$ma^s(a^t-1)^v + nb^s(b^t-1)^v = \triangle^v f(s)$$

where v has the values 1 to 4.

But $A = a^t - 1$, and $B = b^t - 1$, then $ma^sA^v + nb^sB^v = \triangle^v f(s)$ where v has again the values 1 to 4.

From this may be deduced the equations:

$$nb^sB(A-B)=A\triangle f(s)-\triangle^2 f(s)$$
$$nb^sB^2(A-B)=A\triangle^2 f(s)-\triangle^3 f(s)$$
$$nb^sB^3(A-B)=A\triangle^3 f(s)-\triangle^4 f(s)$$

consequently

$$B=\frac{A\triangle^2 f(s)-\triangle^3 f(s)}{A\triangle f(s)-\triangle^2 f(s)}=\frac{A\triangle^3 f(s)-\triangle^4 f(s)}{A\triangle^2 f(s)-\triangle^3 f(s)}.$$

Multiplying out the terms of this last equation and collecting like terms, the following quadratic in A is obtained, viz:

$$A^2[\{\triangle^2 f(s)\}^2-\triangle f(s)\ .\ \triangle^3 f(s)]-A[\triangle^2 f(s)\ .\ \triangle^3 f(s)-\triangle f(s)\ .\ \triangle^4 f(s)]$$
$$+[\{\triangle^3 f(s)\}^2-\triangle^2 f(s)\ .\ \triangle^4 f(s)]=0.$$

The solution of this equation gives the values of A and B from which, since $a=(A+1)\frac{1}{t}$ and $b=(B+1)\frac{1}{t}$, the values of a and b are readily obtained, and from these by substitution in the above equations the values of m and n may be obtained and thence the value of K. In the case in question the values of these constants were as follows: $K=4.7216014$; $a=1.10808$; $b=1.01495$; $m=-.0001674$; and $n=-.7214340$; while the values adopted for s and t were, respectively, 0 and 20. From these we may readily obtain $k=52{,}674$; $\alpha=.99961$, and $\beta=.18998$. The series so obtained for successive quinary values of x gives the adjusted quinquennial results corresponding to the population norm of Table VI, while the subtraction of each term of this adjusted series from the preceding term gives the adjusted results for quinquennial age groups corresponding to the standard population figures of Table III. A comparison of the adjusted and unadjusted results for quinquennial ages is furnished in the following table:

TABLE IX.—*Persons.*

Age.	Adjusted proportion per 10,000 at and above x. $\left(\int_x^\omega l_x dx\right)$	Adjusted proportion in successive quinquennial age groups. $\left(\int_x^{x+5} l_x dx\right)$	Unadjusted proportion per 10,000 in quinquennial age groups.	Deviation.	Accumulated deviation.
0	10,000	1,203	1,228	−25	−25
5	8,797	1,135	1,129	+ 6	−19
10	7,662	1,061	1,047	+14	− 5
15	6,601	982	977	+ 5	0
20	5,619	898	923	−25	−25
25	4,721	812	810	+ 2	−23
30	3,909	725	710	+15	− 8
35	3,184	640	632	+ 8	0
40	2,544	557	557	0	0
45	1,987	479	467	+12	+12
50	1,508	404	415	−11	+ 1
55	1,104	336	337	− 1	0
60	768	270	281	−11	−11
65	498	208	205	+ 3	− 8
70	290	146	143	+ 3	− 5
75	144	89	84	+ 5	0
80	55	41	39	+ 2	+ 2
85	14	12	12	0	+ 2
90	2	2	3	− 1	+ 1
95	.....	.....	1	− 1	0

It will be seen from the above that the adjusted results accord very closely with the unadjusted population norm, the aggregate deviation being 150, as compared with 260 in the case of Germany, the country whose aggregate deviation from the norm was least. The maximum deviation in the case of the smoothed results was only −25 as compared with +56 for Germany. The mean age for the adjusted figures given in Table IX is 27.204 years as compared with 27.148 years for the unadjusted figures in Table VIII, a deviation of only 0.056 year.

ADJUSTED POPULATION NORM FOR INDIVIDUAL AGES.

The values of the constants given in the preceding section admit of the ready computation of an adjusted normal distribution for individual ages. The results are as follows:

TABLE X.

Age last birthday.	Proportion per 10,000.	Age last birthday.	Proportion per 10,000.	Age last birthday.	Proportion per 10,000.	Age last birthday.	Proportion per 10,000.
0	246	25	169	50	86	74	24
1	243	26	166	51	84	75	22
2	241	27	162	52	81	76	20
3	238	28	159	53	78	77	18
4	235	29	156	54	75	78	16
5	233	30	152	55	73	79	13
6	230	31	149	56	70	80	11
7	227	32	145	57	67	81	10
8	224	33	141	58	64	82	8
9	221	34	138	59	62	83	7
10	219	35	135	60	59	84	5
11	215	36	131	61	57	85	4
12	212	37	128	62	54	86	3
13	209	38	125	63	51	87	2
14	206	39	121	64	49	88	2
15	203	40	118	65	46	89	1
16	200	41	115	66	44	90	
17	196	42	111	67	42	91	
18	193	43	108	68	39	92	2
19	190	44	105	69	37	93	
20	186	45	102	70	34	94	
21	183	46	99	71	32	All ages.	10,000
22	180	47	96	72	29		
23	176	48	93	73	27		
24	173	49	89				

FREQUENCY CURVE ORDINATES FOR INDIVIDUAL AGES.

The curve so drawn that the areas standing upon successive units of the base line are represented by values shown in Table X, is one form of frequency curve representing the adjusted population norm. The values of the constants given in section 9 enable the values of the ordinates to this curve to be readily computed. It is clear from the nature of the case that the area of the curve is finite, although the contact of the curve with the base line is infinitely remote. It is also clear that that portion of the area extending to the right of any given ordinate corresponding to age x, represents the proportion in the adjusted population norm at and above the age x, and consequently

that it is represented by $k\alpha^{ax}\beta^{bx}$. It follows, therefore, that the ordinate corresponding to age x is the magnitude irrespective of sign of

$$\frac{d}{ax}k\alpha^{ax}\beta^{bx}=k\alpha^{ax}\beta^{bx}\{ca^x+d^{bx}\}$$

where $c=|\log_e\alpha\log_e a|$ and $d=|\log_e\beta.\log_e b|$

the expression N denoting the numerical value of N irrespective of sign. In the present instance, since α and β are each less than unity $\log_e\alpha$ and $\log_e\beta$ are negative quantities, while $\log_e a$ and $\log_e b$ are positive, a and b being each greater than unity; hence $c=-\log_e\alpha.\log_e a$, and $\alpha=-\log_e\beta.\log_e b$. Substituting for α, β, a, and b the values given above we have

$$c=.0000396 \text{ and } d=.0246443.$$

AGE AND SEX CONSTITUTION OF POPULATIONS CONSISTING MAINLY OF NONEUROPEAN RACES.

For the purposes of the present paper it has been considered sufficient to take out the results for three such populations only, viz, those of India, Ceylon, and the Cape of Good Hope, the censuses of 1901 being taken for the first two and that of 1904 for the last mentioned. In none of the three cases does the population consist wholly of persons of non-European race, but in each instance the predominant races are non-European. In the cases of India and Ceylon the figures for ages above 60 are estimates based on sample tabulations furnished in the several reports.

Table XI hereunder gives for the three countries mentioned similar particulars to those given for European races in Tables I, II, and III.

TABLE XI.—*Age distribution per 10,000 of population mainly comprising colored races.*

Country.	Population.	Age groups.																					Total.
		0	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 and over.	
India (1901):																							
Male.....	149,951,824	266	988	1,394	1,264	866	787	879	848	609	648	370	437	177	254	66	76	27	30	5	6	3	10,000
Female...	144,409,232	276	1,063	1,382	1,081	835	892	894	851	557	652	339	452	169	303	79	91	32	35	6	7	4	10,000
Combined	294,361,056	271	1,025	1,388	1,174	851	838	887	850	583	650	355	445	173	278	72	84	29	33	5	6	3	10,000
Ceylon (1901):																							
Male.....	1,903,359	522	1,212	1,392	1,063	948	964	1,027	638	665	359	361	221	322	84	85	46	43	20	16	8	4	10,000
Female...	1,670,060	563	1,293	1,438	967	1,235	1,041	1,025	492	606	291	419	164	234	126	33	38	13	15	2	3	2	10,000
Combined	3,573,419	541	1,250	1,414	1,018	1,083	1,000	1,026	570	637	327	388	194	281	103	61	42	29	17	10	6	3	10,000
Cape of Good Hope (1904):																							
Male.....	1,218,940	345	1,140	1,348	1,280	1,018	964	856	705	561	484	358	303	181	178	100	87	42	30	11	6	3	10,000
Female...	1,190,864	367	1,206	1,359	1,258	1,040	980	834	709	506	452	331	302	175	184	98	95	42	38	12	8	4	10,000
Combined	2,409,804	356	1,172	1,354	1,269	1,029	972	845	707	534	468	345	303	178	181	99	91	42	34	11	7	3	10,000
Total:																							
Male.....	153,074,123	270	992	1,394	1,261	868	791	881	844	609	644	370	433	179	251	66	76	27	30	5	6	3	10,000
Female...	147,270,156	280	1,067	1,383	1,082	841	894	895	846	558	646	340	448	169	300	78	90	32	35	5	7	4	10,000
Combined	300,344,279	275	1,029	1,389	1,173	855	842	888	845	584	645	355	441	174	275	72	83	29	32	5	6	3	10,000

A comparison of these distributions with that of the norm for European races discloses the fact that the deviations from that norm are very considerable, and are of such a character that it appears undesirable to attempt the combination of data for European and non-European races with the object of obtaining a world norm. The matter, however, is receiving further consideration in the light of the more extensive and more recent data now being collected.

The results obtained for a comparison of non-European races with the norm for European races, corresponding to the results given in Table VII, are as follows:

TABLE XII.

Country.	Aggregate of deviations from norm for European races, in proportion per 10,000.			Sign and magnitude of maximum deviation.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
India	1,588	1,626	1,598	+255	+263	+259
Ceylon	2,120	3,074	2,514	+253	+340	+288
Cape of Good Hope	1,646	1,918	1,778	+223	+253	+225
Aggregate of above three	1,578	1,612	1,588	+255	+264	+260

A comparison of Table XII with Table VII will indicate that even the most divergent of the populations of European race were very much nearer the European norm than any of these three or the three combined. It may be further noted that the mean ages of these three populations deduced in the manner indicated in section 8 above, are as follows:

TABLE XIII.

Country.	Approximate mean ages in years.			Number of years by which the mean age exceeds that of the European norm.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
India (1901)	24.675	25.010	24.833	−2.259	−2.331	−2.315
Ceylon (1901)	22.462	20.954	21.753	−4.472	−6.387	−5.395
Cape of Good Hope (1904)	23.243	22.948	23.093	−3.691	−4.393	−4.055
Aggregate of above three	24.633	24.936	24.770	−2.301	−2.405	−2.378

COMPARISON OF BIRTH, DEATH, MARRIAGE, AND OTHER RATES.

As noted in section 6 above, one of the uses of a population norm is that of facilitating the comparison of birth, death, marriage, and other rates which are functions of age, for different communities for the same period, for the same community for different periods, or for both sets of variation in conjunction. If the constitution of a given community as regards number, sex, and age remained constant it

is clear that the actual number of births, deaths, marriages, etc., per unit of time would furnish all that would be required for a comparison for the same community for different periods. If, however, the number be conceived as varying while the age and sex constitution remain uniform, it becomes necessary to artificially bring about the conditions of identity just referred to, by considering the case of some definite number such as a 100, 1,000, 10,000, etc., in each, and by ascertaining the number of the events under observation which occurred within this representative microcosm in each case. The process in this instance is merely a matter of division. When we further complicate the issue by conceiving the sex and age constitution as varying, we arrive at the condition of affairs actually existing in nature, and we require some means of eliminating the effects due to those variations, and of ascertaining the results which would have been obtained in the various periods if the conditions as to number, sex, and age had been uniform throughout. Similar considerations apply to the comparison of different communities. The population norm furnishes one of the means which have been employed with the object of bringing about the conditions requisite for reliable comparisons of this nature, more especially in the case of statistics of deaths and the computation of death rates.

GROWTH OF MORTALITY STATISTICS.

In this connection it may be noted that extensive statistics of deaths (or, more strictly, of burials) were available long before reliable statistics of population, and hence, for general purposes, the only comparison that could be made between different communities was that of the number of deaths in each. Where, in addition to the mere number of deaths, statistics as to ages were available, a means though necessarily in a community of varying constitution a defective one, was provided for working back from deaths to population. Two very ingenious attempts to compute statistics of rates of mortality from death records only are furnished by Dr. Halley's table constructed from the Breslau experience, and that of Dr. Price constructed from the burial records of the parish of All Saints, Northampton. If the communities from which these records were obtained had been stationary for a large number of years, migration being nil, and the annual gain by births being just sufficient to cover the annual loss by deaths, these burial records, if complete, would have furnished a reliable foundation for the tables based upon them. As, however, these conditions were wanting, the tables deduced were necessarily defective. With the advent of reliable statistics of population a basis of comparison was made available in the "crude death rate" obtained by dividing the number of deaths by the number of population. Later, when the full significance of the effect of age

and sex constitution on such "crude death rates" was recognized, efforts were made to obtain some convenient method which would take these into account without seriously affecting the facility of computation and comparison. Where statistics of both population and deaths are available for each sex for fairly small age groups death rates per 1,000 may readily be computed for each sex and age group. Such rates form a very reliable basis of comparison, but they are extremely clumsy to quote and by no means easy to compare. We have, in fact, a difficulty similar to that referred to in section 7 above in connection with the comparison of the age and sex constitution of different populations. For the purpose of facilitating such comparisons several methods have been adopted at various times of which it is proposed here to deal briefly with the following three, which are probably the most important: (*a*) The calculation of an "index of mortality," (*b*) the calculation of a "factor for correction" for age and sex distribution, (*c*) the calculation of the "expectation of life" at age 0.

INDEX OF MORTALITY.

The function which has been termed the "index of mortality" of any community represents the "crude death rate" which would have been experienced in some population norm if the ascertained death rates for selected age groups in the community under review had been in operation in the population norm. Viewed somewhat differently the index of mortality may be said to be the crude death rate which would have been experienced in the community, if the age distribution of the community had been the same as that of the population norm. A "standard population" or "norm" which has been adopted for this purpose by the International Statistical Institute is that of Sweden for the census of 1890, the sexes being combined and the age groups chosen being those for ages last birthday, 0, 1 to 19, 20 to 39, 40 to 59, and 60 and over. Some difference of opinion existed among the members of the International Statistical Institute as to the range of ages which should be employed in the "standard" population, and as to the source from which the "standard" should be obtained. Dr. Ogle, as already noted, favored a "standard" representing the aggregate for a number of countries, divided according to sex, and into quinquennial and decennial age groups. On the other hand Prof. Körösi, after trial of several bases recommended the restricted age grouping 0, 1 to 19, 20 to 49, 50 and over, as being comparatively simple and giving results which did not differ materially from those obtained on a more extended basis of grouping. On general consideration it may be said that in view of the well-defined difference between male and female mortality and the variations in the proportions of males and females in different countries and different ages, it would appear desirable to distinguish

between the sexes. Further, that in view of the differing proportions of population in different communities in the various age groups and of the marked variation in the rates of mortality at different ages, it is not desirable that the range of ages in any group should be large, since with a large range any comparison made will often be between unlike things. For example, it will be seen from Table VI in section 5 above, that the proportion per 10,000 of total population at and above age 60, varied from 622 for Australia to 1,192 for Sweden, thus clearly indicating that the groups aged 60 and upward in these communities could not be homogeneous, and consequently that the death rate for a group aged "60 and upward" must mean very different things in the different communities.

The undesirability of an extensive range of ages in any group may further be shown by consideration of the variation in rates of mortality with age as shown in the following table. The values contained in it have been deduced from the life table for England and Wales for the decennium 1891 to 1900, and will suffice for the purpose of illustration.

TABLE XIV.—*Approximate rate of mortality in age groups.*

Age group.	Death rate per 1,000.	Ratio of death rate to minimum rate shown.	Age group.	Death rate per 1,000.	Ratio of death rate to minimum rate shown.
0	173.6	69.4	50 to 54	19.3	7.7
1 to 4	24.5	9.8	55 to 59	26.7	10.7
5 to 9	4.3	1.7	60 to 64	37.6	15.0
10 to 14	2.5	1.0	65 to 69	54.3	21.7
15 to 19	3.7	1.5	70 to 74	80.7	32.3
20 to 24	4.8	1.9	75 to 79	119.9	48.0
25 to 29	5.8	2.3	80 to 84	175.4	70.2
30 to 34	7.2	2.9	85 to 89	250.5	100.2
35 to 39	9.4	3.8	90 to 94	346.2	138.5
40 to 44	11.8	4.7	95	466.2	186.5
45 to 49	14.7	5.9	All ages	21.8	8.7

Using the age grouping of the International Statistical Institute's "Index" the rates deduced from the same source are as follows:

TABLE XV.

Age group.	Death rate per 1,000.	Ratio of death rate to minimum rate shown.	Age group.	Death rate per 1,000.	Ratio of death rate to minimum rate shown.
0	173.6	25.9	40 to 59	17.6	2.6
1 to 19	8.2	1.2	60 and over	73.8	11.0
20 to 39	6.7	1.0	All ages	21.8	3.3

The remarkable difference in range shown by the two preceding tables indicates clearly the necessity for the use of age groups of fairly restricted range in the calculation of reliable indexes of mor-

tality. For example, a young community in which there were no persons above the age of 75 would have an unduly low index as compared with one in which the old-age distribution was normal. In general, it may be said that where practicable, the size of the group should be so chosen that the distribution within the group is not markedly dissimilar in the case of any two populations under comparison. Where groups with a range as small as five years are chosen, it may be usually considered that such a result has been fairly attained. In many cases, however, where there is not a very marked difference between the age and sex constitutions of the different populations the institute's "standard" grouping gives fairly satisfactory results. The following table gives an interesting comparison for the six States of the Commonwealth of Australia for the year 1910:

TABLE XVI.—*Number of deaths per 1,000 of mean population, 1910.*

Age groups.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Commonwealth of Australia.
Under 1 year	75.66	79.66	63.57	72.79	81.74	105.79	76.57
1 and under 20	3.21	3.01	3.10	2.68	4.16	3.64	3.17
20 and under 40	4.00	4.51	4.80	4.58	5.22	4.76	4.42
40 and under 60	10.37	10.59	11.78	11.03	12.29	9.75	10.78
60 and over	53.07	66.53	52.62	53.28	50.59	54.20	57.48
Crude death rate	9.89	11.49	9.71	10.21	10.11	11.10	10.43

Grouping the population norm of Table III, as in the Statistical Institute's "standard," and applying these rates to the respective groups will furnish the results shown in column (4) of the attached table, while the "indexes" based on the institute's standard are given in column (6), the crude death rates being shown in column (2). In each case the ratio of the several rates to that of New South Wales taken as unity is shown.

TABLE XVII.—*Crude death rates and "indexes of mortality," Australia, 1910.*

State.	Crude death rate.		Index based on norm of Table III.		Index based on institute standard.	
	Rate per 1,000 of population.	Ratio to rate for New South Wales.	Index.	Ratio to index for New South Wales.	Index.	Ratio to index for New South Wales.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
New South Wales	9.89	1.000	10.48	1.000	12.36	1.000
Victoria	11.49	1.162	11.74	1.120	14.11	1.142
Queensland	9.71	.982	10.58	1.010	12.44	1.006
South Australia	10.21	1.032	10.50	1.002	12.39	1.002
Western Australia	10.11	1.022	11.56	1.103	13.31	1.077
Tasmania	11.10	1.122	11.66	1.111	13.59	1.100
Commonwealth of Australia	10.43	1.055	11.02	1.052	13.06	1.057

The ratios given in columns (5) and (7) of the above table indicate that in so far as New South Wales, Queensland, South Australia, and the Commonwealth as a whole are concerned the two bases give very similar results, and that in the case of Tasmania the divergence is not very wide. In the cases of Victoria and Western Australia, however, considerable want of accord is shown, and it is in these two States that the group of 60 and upward departs most in distribution from the corresponding group in the other States and the Commonwealth. In Victoria the number at old ages is in comparison unduly high and in Western Australia unduly low. This indicates that the group "60 and over" has too wide a range to furnish reliable results.

For the Decennial Supplement to the Report of the Registrar General of England and Wales it has been usual to compute for each county and district the "index of mortality" for the decennium under review, the population norm employed being the mean population of England and Wales for that decennium, while the requisite rates are computed for each sex in each of the age groups 0 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74, and 75 and over. The rate so obtained is, however, not spoken of as the "index of mortality," but is called the "rate in standard population."

"FACTOR FOR CORRECTION" FOR AGE AND SEX DISTRIBUTION.

Since 1883 the registrar general of England and Wales has supplied in his annual summaries "corrected death rates" for the principal English towns. The method of correction is in some respects the inverse of that followed in determining the "index of mortality." The first step in the process is that of computing for each town a "standard death rate," being the crude rate which would have been experienced if the average death rate for each sex and age group for the whole of England and Wales during the preceding intercensal period had been in operation for a year in a population distributed according to sex and age as that of the town was at the date of the census. The ratio of the crude death rate of England and Wales for the preceding intercensal period to this "standard" rate is the town's "factor for correction" for age and sex distribution. The crude death rate of the town for any year of a current intercensal period is then "corrected" by multiplying it by this factor. It will be seen that in the computation of the index of mortality for any community for a given year, the detailed death rates of the community for the year under review are ascertained and applied to the population norm, whereas in computing the "factor for correction" the detailed death rate for the normal population is ascertained

and applied to the distributed population of the community under review. Of the two the "index" is certainly the better measure of mortality, but the "factor for correction" furnishes a convenient means of approximation for an intercensal period, since it involves less minute record and less extensive calculation than the "index."

EXPECTATION OF LIFE.

There can be little doubt that the expectation of life at age 0 practically furnishes the best average statement of mortality experience, while, however, possessing the defect inherent in all averages, or similar functions, viz, inability to indicate distribution. It is, further, a function which requires for its computation considerable detail in the data, and even when such detail is available the process is somewhat lengthy and involved. It is not proposed in the present paper to give more than a general reference to the question of "expectation of life" and its relation to the idea of population norms. In determining the expectation of life in any community the rates of mortality are computed for each age from returns of population and deaths, and the effect is considered of a given number of persons, say, 100,000, commencing at age 0 and being subjected successively to the rates of mortality so ascertained. By such means a suppositious population norm known as a "life table" is obtained, from which may be computed the average number of years of life lived by each of the 100,000 persons who were considered as coming under observation at age 0. This average is what is technically known as the "expectation of life" at age 0, and is probably as reliable and satisfactory an expression for the mortality of a community as can be obtained in the compass of a single number. If the number who attain age x according to the life table be denoted by l_x the expectation of life at age 0 may be denoted by $\int_0^\omega x l_x dx \quad \int_0^\omega l_x d_x x,$ where ω denotes the oldest age in the table. In actual practice it is usually considered desirable in constructing a life table to graduate the results, but this is more a matter of statistical technique than an essential requirement, at all events, in so far as the uses of a life table for obtaining reliable comparison of mortality rates is concerned. Indeed, it may be said that any graduation which has the effect of materially altering the "expectation of life" at age 0 as deduced from the unadjusted data, fails to comply with one of the standards for a good graduation. Apart, however, from the question of graduation the construction of a life table from rates for single ages is a somewhat heavy undertaking, requiring data in considerable detail. For the purpose of reducing the labor involved various "short methods" of computation

have been devised of which those of Dr. Farr and Dr. Hayward are probably the best known, but a review of such methods would be outside the objects of the present paper.

REVIEW OF METHODS OF COMPUTING DEATH RATES FOR COMPARATIVE PURPOSES.

It may thus be said that of the four functions expressive of death rates, viz: (I) crude death rate, (II) factor for correction for age and sex distribution, (III) index of mortality, and (IV) expectation of life at age 0, the last mentioned is the most accurate but is the least readily computed, whilst the first is the least accurate but the most readily computed. The "factor for correction" and the "index of mortality" occupy an intermediate position between these two in the matter of accuracy and also of difficulty of computation. In general, it may be said that increasing difficulty of computation accompanies increases in the accuracy of the results for comparative purposes. At the same time, it is to be noted that nothing can fully take the place of the complete statement of distribution, since any of the four methods may give identical results in an infinite number of ways not materially identical.

RELATION BETWEEN MASCULINITY AND DEATH RATES.

The population function representing the ratio of the number of males in any experience to the number of females is usually termed "the masculinity of the experience." In actual practice it is usual to express the masculinity as the number of males to each 100 females, but for theoretical investigations it is, of course, better to deal with the ratio itself. This ratio possesses some interesting relations to the rates of mortality for males, females, and persons which may appropriately be domonstrated here. Let m' denote the crude death rate per unit for males, m'' the rate for females, m the rate for persons (males and females combined), and let $M=1+\mu$ denote the masculinity of the population. Then

$$\begin{aligned} m &= \frac{Mm'+m''}{M+1} = \frac{(1+\mu)m'+m''}{2+\mu} \\ &= \left\{\frac{m'+m''}{2}+\frac{\mu m'}{2}\right\}\left\{1+\frac{\mu}{2}\right\}^{-1} \\ &= \frac{1}{2}(m'+m'')+\frac{\mu}{4}(m'-m'')\left(1+\frac{\mu}{2}\right)^{-1} \\ &= \frac{1}{2}(m'+m'')+\frac{\mu}{4}(m'-m'')\left(1-\frac{\mu}{2}+\frac{\mu^2}{4}-\text{etc.}\right) \end{aligned}$$

In most cases it will be sufficient to take

$$m=\frac{1}{2}(m'+m'')+\frac{\mu}{4}(m'-m'')$$

In cases where indexes of mortality have been computed for males and females separately, the index for the whole population may be computed by means of the above formulæ, using m' to denote the male index, m'' the female index, m the index for the whole population and $M=1+\mu$ the masculinity of the population norm.

If $M=1$, that is if the males and females are equal in number, we have $\mu=0$ and consequently $m=\frac{1}{2}(m'+m'')$

It may be further readily shown that $m=m'-\frac{m'-m''}{2+\mu}$ and hence that $\frac{m'-m}{m'-m''}=\frac{1}{2+\mu}$

This latter is the ratio of the number of females to the total population.

It may also be shown that $\mu=\frac{2m-(m'+m'')}{m'-m}$

and consequently that $M=1+\mu=\frac{m-m''}{m'-m}$

If instead of denoting masculinity by $M=1+\mu$, the ratio of the number of males to the number of females, we use the function $\mu'=\frac{\text{males}-\text{females}}{\text{males}+\text{females}}$, that is, the ratio of the excess of males over females to the total population, the expression for m may be simplified.

Thus, $$\mu=\frac{(1+\mu)-1}{(1+\mu)+1}=\frac{\mu}{2}\left(1+\frac{\mu}{2}\right)^{-1}$$

Hence $$m=\frac{1}{2}(m'+m'')+\frac{\mu'}{2}(m'-m'')$$

also $$\mu'=\frac{2m-(m'+m'')}{m'-m''}=\mu\frac{m'-m}{m'-m''}$$

RELATION OF MALE AND FEMALE DEATH RATES FOR VARIOUS DISEASES.

In the course of the paper read by one of us (G. H. Knibbs) before the Australasian Medical Congress in Sydney, September, 1911, it has been shown that in some diseases the ratio of the death rate of males to that of females appears to be sensibly constant, whilst in other cases the ratio appears to vary with time, in general disclosing the fact that improvement in the rate of male mortality is slightly slower than in the case of female mortality. For example, in the case of (I) pulmonary tuberculosis, (II) cancer, (II) whooping cough, (IV) typhoid fever the following formulæ were obtained from the Australian experience for the 30 years 1881–1910. In each case M denotes the ratio of male to female death rate from

the disease specified, while T denotes the calendar year for which information is sought.

Pulmonary tuberculosis: $M = 1.386 - .0053\ (T-1880)$.

Cancer: $M = .983 + .0022\ (T-1880)$.

Whooping cough: $M = .593 + .0073\ (T-1880)$.

Typhoid fever: $M = .951 + .0215\ (T-1880)$.

The experience for the same period in respect of (I) scarlet fever, (II) measles, (III) diphtheria and croup, (IV) diarrhea, enteritis, and dysentery, furnished indications that the ratio of male death rate to female death rate for successive periods was approximately constant.

These results indicate the necessity which exists for separately considering the male and female elements of population in any inquiry which aims at accuracy of comparison.

CONCLUSION.

In conclusion, it may be said (*a*) that it is desirable that the Swedish norm should now be abandoned for the computation of indexes of mortality, and that one corresponding to the aggregate of the European races should be substituted in lieu thereof; (*b*) that the age groups adopted should be 0, 1 to 4, 5 to 9, and the successive quinquennial groups thereafter; (*c*) that sexes should be dealt with separately; and (*d*) that, where practicable, expectations of life should be computed.

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[1] In this notation, which is consistent with that adopted by the International Congress of Actuaries, ${}_aL^{\circ}{}_4$ denotes the number in population a (P_a) whose age is under 5 years, and similarly throughout.

[2] See proceedings of the International Statistical Institute. Vienna. 1891.

The proceedings of a Joint Session of Sections IV and IX are found in Volume I, Part II.

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